THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXVII. No. 1721.] LONDON, MAY 5, 1896. [48TH YEAR. PRICE 6d.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

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MANY HUNDREDS WORKING AT GAS-WORKS.
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MELDRUM BROS., ATLANTIC WORKS, MANCHESTER.
Also at LONDON, LEEDS, NEWCASTLE, LIVERPOOL, and BIRMINGHAM.

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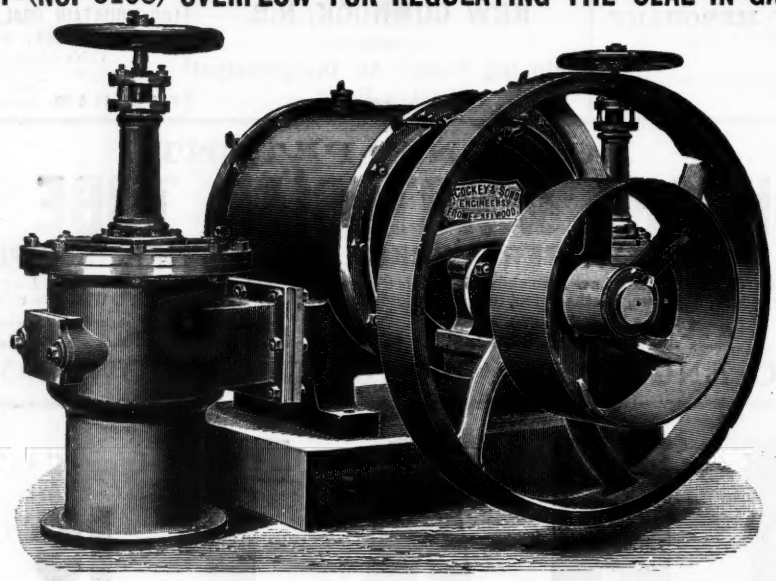

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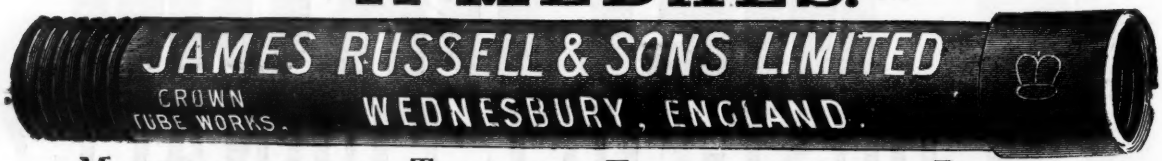

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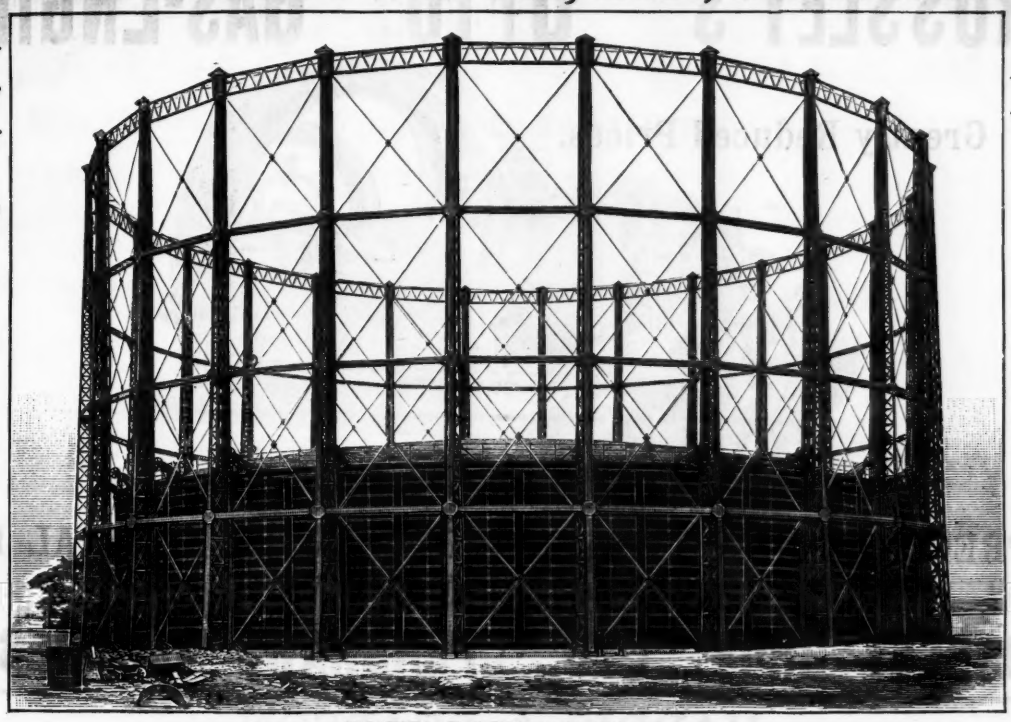

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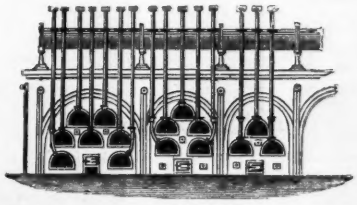

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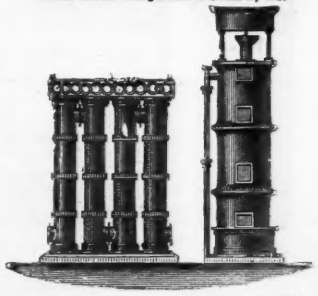

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PURIFIERS with Planed Joints,
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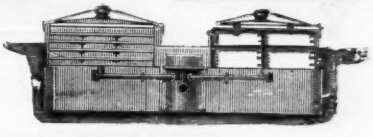

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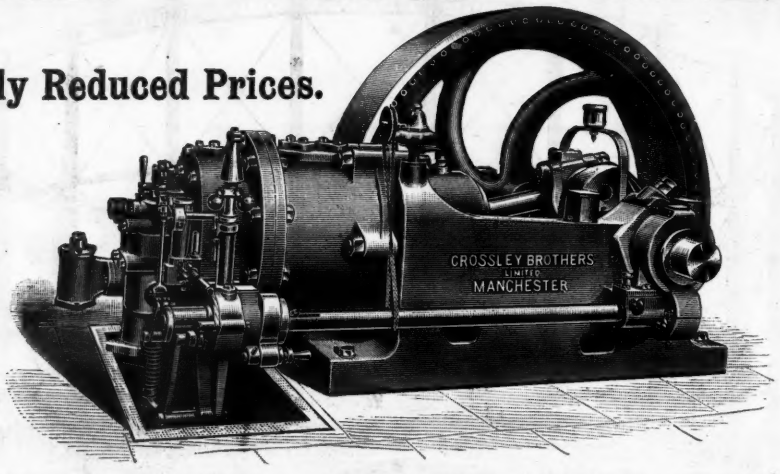

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(Welsbach Patents).

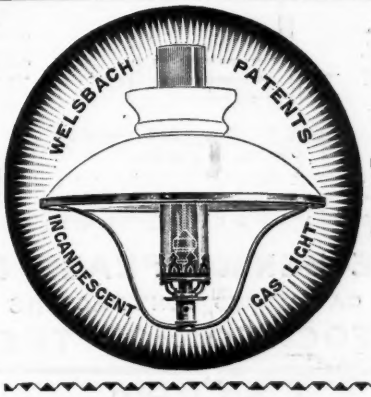
Further Great Reduction in Prices,

FROM MARCH 2, 1896,

Due to Colossal Sales,

Places this highly popular Light within the means of all classes.

The greatly Reduced Consumption of Gas COVERS THE INITIAL COST OF THE BURNERS IN FROM SIX TO EIGHT MONTHS.



The PRICES have been REDUCED as follows:—

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The "C" Bye-Pass Burner to 7s. 6d.

Prices of other Patterns reduced proportionately.

SPECIAL ATTENTION IS CALLED TO THE

"S" BYE-PASS BURNER, PRICE 7s. 6d.

Which, with a Consumption of 2¼ Cubic Feet of Gas an hour, gives a light of 25 to 30 Candle Power.

This Pattern is particularly recommended where it is desired to effect a large saving in Gas rather than to effect a great increase in the Light.

The attention of Gas Managers and Gas Engineers is called to this System of Lighting as one which tends to Popularize the use of Gas as an Illuminant, owing to the following Advantages—

ECONOMY IN CONSUMPTION OF GAS, COMBINED WITH HIGH ILLUMINATING EFFICIENCY.

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GREATLY REDUCED HEAT.

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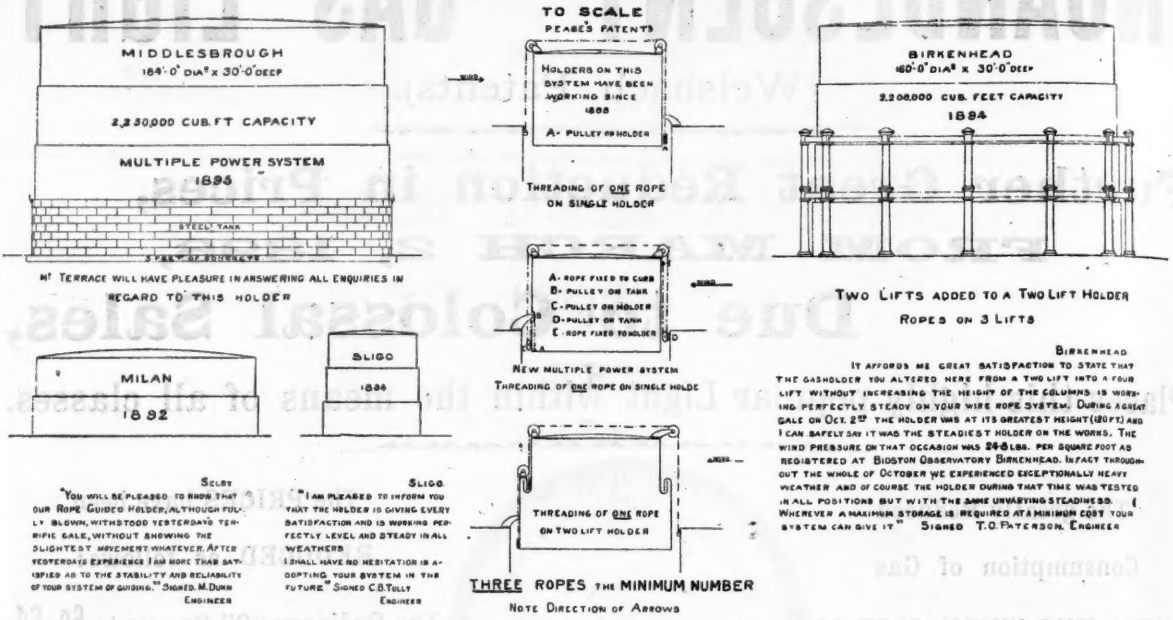
DIAGRAMS ILLUSTRATING REPRESENTATIVE ROPE GASHOLDERS

TO SCALE



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SELBY

"YOU WILL BE PLEASED TO KNOW THAT OUR ROPE GUIDED HOLDER, ALTHOUGH FULLY BLOWN, WITHSTOOD YESTERDAYS TERRIFIC GALE, WITHOUT SHOWING THE SLIGHTEST MOVEMENT WHATEVER. AFTER YESTERDAYS EXPERIENCE I AM MORE THAN SATISFIED AS TO THE STABILITY AND RELIABILITY OF YOUR SYSTEM OF GUIDING." SIGNED. M. DUNN ENGINEER

SLIGO.

"I AM PLEASED TO INFORM YOU THAT THE HOLDER IS GIVING EVERY SATISFACTION AND IS WORKING PERFECTLY LEVEL AND STEADY IN ALL WEATHERS I SHALL HAVE NO HESITATION IN ADOPTING YOUR SYSTEM IN THE FUTURE." SIGNED C.B. TULLY ENGINEER

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IT AFFORDS ME GREAT SATISFACTION TO STATE THAT THE GASHOLDER YOU ALTERED HERE FROM A TWO LIFT INTO A FOUR LIFT WITHOUT INCREASING THE HEIGHT OF THE COLUMNS IS WORKING PERFECTLY STEADY ON YOUR WIRE ROPE SYSTEM. DURING A GREAT GALE ON OCT. 2ND THE HOLDER WAS AT ITS GREATEST HEIGHT (120 FT.) AND I CAN SAFELY SAY IT WAS THE STEADIEST HOLDER ON THE WORKS. THE WIND PRESSURE ON THAT OCCASION WAS 24 LBS. PER SQUARE FOOT AS REGISTERED AT BIDSTON OBSERVATORY BIRKENHEAD. IN FACT THROUGHOUT THE WHOLE OF OCTOBER WE EXPERIENCED EXCEPTIONALLY HEAVY WEATHER AND OF COURSE THE HOLDER DURING THAT TIME WAS TESTED IN ALL POSITIONS BUT WITH THE SAME UNVARYING STEADINESS. WHEREVER A MAXIMUM STORAGE IS REQUIRED AT A MINIMUM COST YOUR SYSTEM CAN GIVE IT." SIGNED T.O. PATERSON, ENGINEER

THESE HOLDERS ARE CONSPICUOUS FOR STEADY AND LEVEL WORKING UNDER ALL CONDITIONS. THEY WORK WITH MUCH LESS FRICTION AND IRREGULARITY IN A GALE OF WIND THAN GASHOLDERS WITH COLUMNS, AND ARE ALWAYS STEADY.

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Improvements in Sulphate of Ammonia Apparatus

(COLSON'S PATENT)

EXTRACT FROM ENGINEER'S REPORT—

"I can now obtain **60** Tons of Sulphate of Ammonia per week with 'Colson's' Still, using ONE Boiler, whereas, with my former continuous plant, TWO Boilers were required to produce **40** Tons per week."

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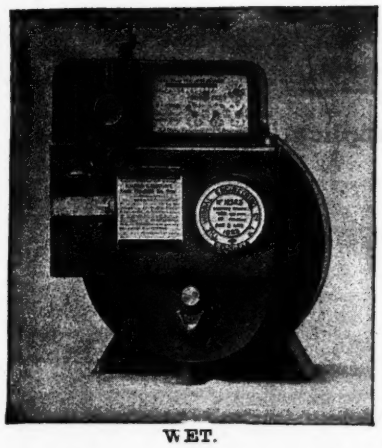
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THE
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AUTOMATIC.

Simple! Positive!! Accurate!!!

The only Prepayment Meter with no Springs, Counter-Balance Weights, or Frictional Gearing to get out of order.

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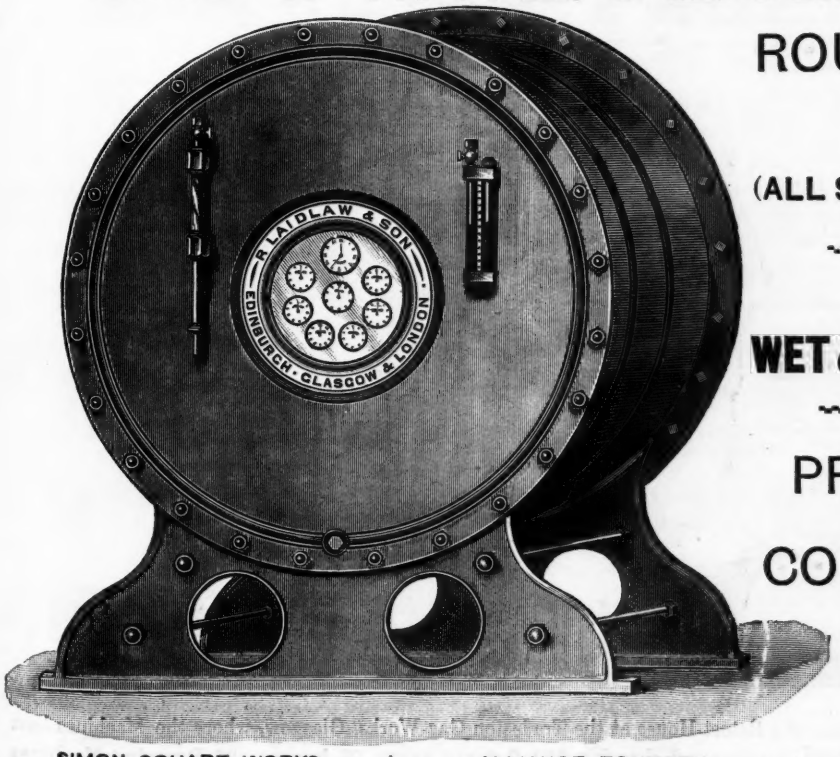

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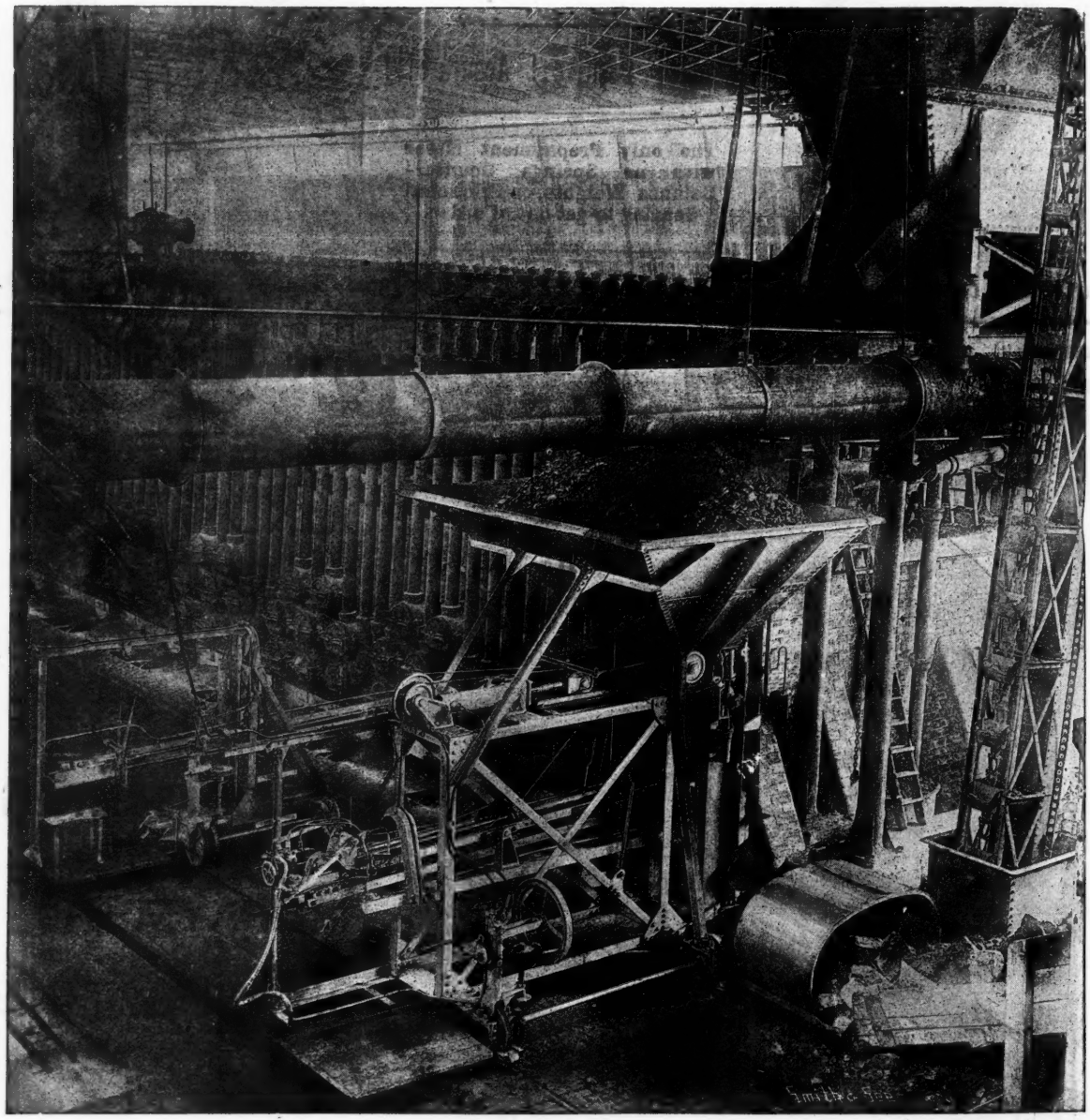

The above engraving shows the interior of a Retort-House at the Tradeston Gas-Works, Glasgow, where the Machines have been at work since the beginning of 1893, drawing and charging **960 Retorts every 24 hours. 98 Drawing-Machines and 66 Charging-Machines are at work, or in course of construction.**

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TAR-EXTRACTOR.
Extracts all the Tar without choking up.

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Prevents all "Scale," and saves Fuel, &c.

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FOR ENRICHING GAS IN BULK.

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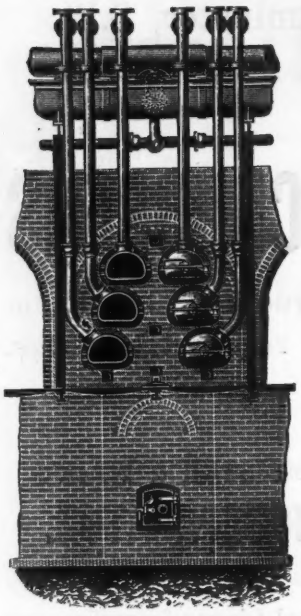

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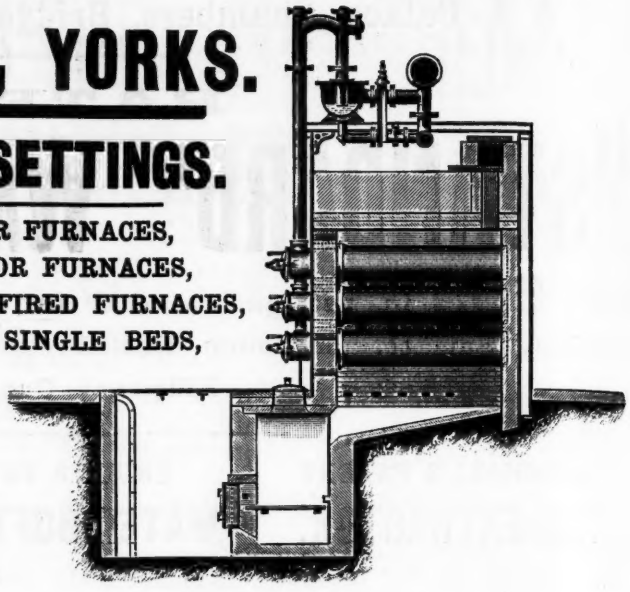
THROUGH & SINGLE BEDS,
SUITABLE FOR

LARGE
OR
SMALL
GAS-WORKS.



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Contractors to Her Majesty's Government, the Indian Government, the Natal Government, the Turkish Government, the Netherlands Railway, the London County Council, &c., &c.

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Kildwick	Shifnal
Kirkburton	Shipston-on-Stour
Knutsford	Sidmouth
Leamington	Skibbereen
Ledbury	Slough
Leek	Southam
Leven, N.B.	Southend
Limerick	Stafford
London	Stamford
Loughborough	Strood
Lymington	Stroud
Merthyr Tydfil	Swinton
Milborne Port	Sudbury
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Outlane	Uppingham
Pembroke	Uttoxeter
Penmaenmawr	Ventnor
Portadown	Warwick
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Richmond	Workington

INCANDESCENT GAS-LIGHT COMPANY, LIMITED,

v.

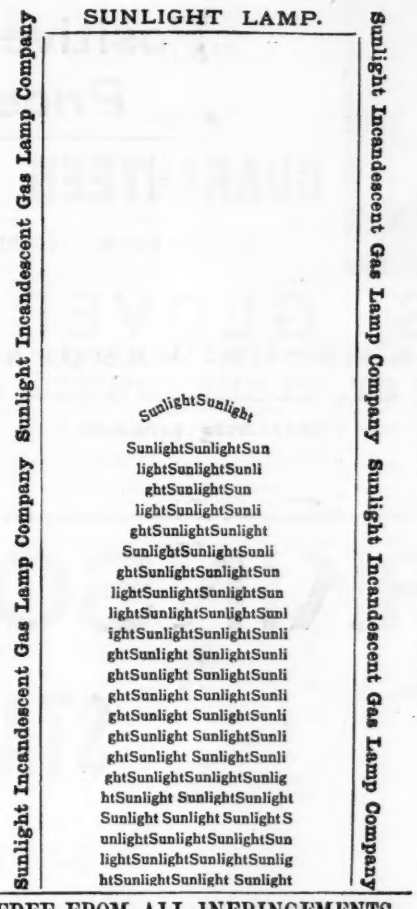
SUNLIGHT GAS-LAMP COMPANY, LIMITED.

JUDGMENT FOR SUNLIGHT COMPANY.

EXTRACTS FROM JUDGMENT.

"No use is made by the Defendants of any of the 'rare earths;' and their choice of substances and their method of applying the illuminants appear to me to be as wide asunder as the poles from those contemplated by Welsbach."

Welsbach "could make no use of the great strength and tenacity of alumina." "The Sunlight process uses alumina very largely indeed."



EXTRACTS FROM JUDGMENT.

Welsbach Company's Counsel "both admit that they have no case unless the Welsbach skeleton, of whatever resistant earth oxides composed, is within the Welsbach Patent. Mr. Terrell says the consequences of an adverse decision on this point are very grave. I am very sorry if they are so; but I cannot help it. It seems to me that this is just what Welsbach did not claim."

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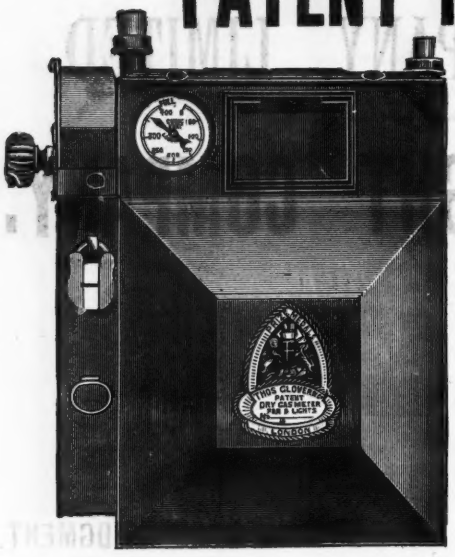

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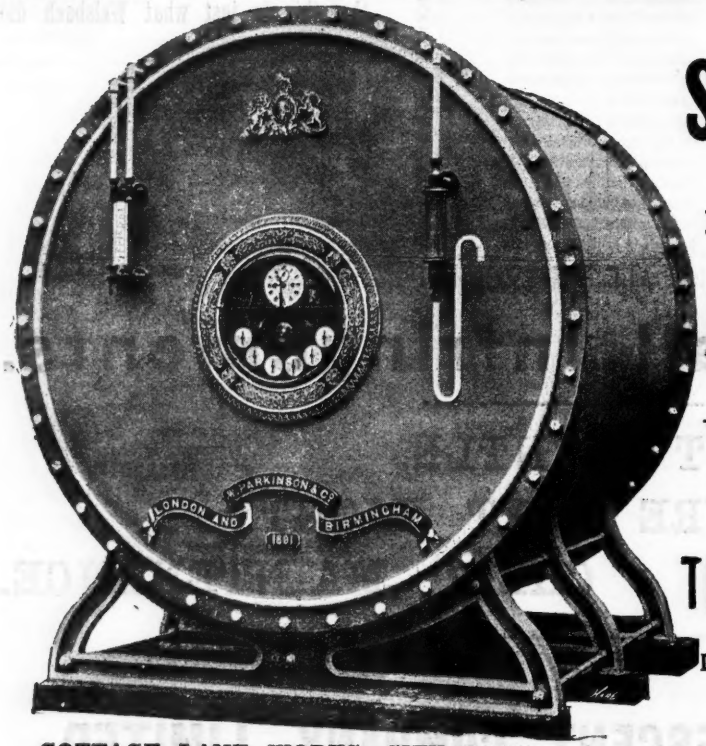

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[See also Advt. p. 1012.

CONTENTS.

EDITORIAL NOTES:—

GAS, LIGHTING, &c.— PAGE

Crisis in the Building Trades . . . 965
Programme of the Meeting of the Institution of Gas Engineers . . 966
The Last Meeting of the South-West District Association . . . 966
The Difficulty of the Federated Coal Industry 966
Tampering with Cheques 967

WATER AND SANITARY AFFAIRS—

The Lords and the Metropolitan Counties Water Board Bill . . 967

ESSAYS, COMMENTARIES, AND REVIEWS:—

Electric Lighting Memoranda 968
The Transactions of the Incorporated Institution of Gas Engineers 969
Some Considerations Respecting Lighting 970

NOTES:—

The Electrolysis of Carbon 971
Good Concrete Superseding Poor Mixtures 971
The Red Colour of Coal Ashes 971
Dr. Henry Morton on the Röntgen Rays 971
The Substitution of Iron for Lead Water-Pipes 971

TECHNICAL RECORD:—

The Institution of Gas Engineers—The Programme for the Forthcoming Meeting 972
South-West of England District Association of Gas Managers—Half-Yearly Meeting at Sherborne—
Amalgamation with the Southern Association 972
Inaugural Address of Mr. T. W. R. White 973
Discussion of Mr. Durkin's Paper on "The Want of Mutuality between Authorities Using the Subsoil of Public Roads" . . 974
Presentation to Mr. N. H. Humphrys 975
Ohio (U.S.A.) Gaslight Association—Annual Meeting at Cincinnati. 975
The Commercial Production of Calcium Carbide 976

REGISTER OF PATENTS:—

Supplying Gas to Atmospheric Burners—Duke, J. F. 977
Incandescent Gas Mantles—Reeser, H. 977
Manufacture of Gas—Ladd, J. H. 977
Constructing Beds for Gas-Retorts—Joyce, M. J. 977
Washing and Scrubbing Gas—Hersey, S., and Kirkham, Hulett, and Chandler, Limited 978
Gas Heating Apparatus—Denayrouze, L. 978
Incandescent Mantles—Crocker, S. H. 978
Electrically Lighting Gas-Jets from a Distance—Morstein, O. von 978
Glow-Bodies for Incandescent Gas Lighting—Kortwich, C. . . 978
Gas-Burner Tubes—Ernst, E. 978
Gas Motor Engines—Abel, C. D. (Gasmotoren Fabrik Deutz) . . 979
Patent Notices 979

CORRESPONDENCE:—

An Acetylene Gas Explosion 980
The Recent Accident to a Gasholder at Gothenburg 980
The Sale of Gas Stock to Consumers 980
The Flash Point of Burning Oils 981
The Remuneration of Gas Collectors 981

PARLIAMENTARY INTELLIGENCE:—

House of Lords—Progress of Bills 981
Metropolitan Counties Water Board Bill 981
House of Commons—Progress of Bills 981
House of Commons Committees—
Matlock Bath Gas Bill 985
Leamington Corporation Bill 987

LEGAL INTELLIGENCE:—

High Court of Justice—Chancery Division—Incandescent Gas-Light Company *v.* Dewey and Co.; Same *v.* Stanley . . . 987
High Court of Justice—Queen's Bench Division—Incandescent Gaslight Company, Limited, *v.* De Mare Incandescent Gas-Light System, Limited; Same *v.* Sunlight Gas-Lamp Company, Limited 987
Birkdale Police Court—The Quality of the Gas Supplied by the Southport Corporation 987
The Charge against an Incandescent Gas-Burner Seller . . . 988
Theft by a Bogus Gas Inspector 988
The Power of a Water Company to Cut Off a Supply 988
Stealing from Prepayment Meters 988
Wilful Waste of Water at Batley 989

MISCELLANEOUS:—

Leeds Corporation Gas Department 989
Gas Affairs at Huddersfield—The Fatal Accident at the Works; The Charge for Gas for Public Lighting 989
Rotherham Corporation Gas and Water Finances 990
Exhibitions of Gas Appliances 990
A Scheme for the Supply of Coke-Oven Gas in Massachusetts . . 990
Electric Lighting Notes 992
Electricity and the Welsbach Burner at Ballarat, Australia . . 993
Gas Supply in Bedfordshire 993
The Projected Transfer of the Portsmouth Water-Works . . . 994
Ipswich Corporation Water Department—The Disposal of the Profits 995
Meeting of the Antwerp Water-Works Company, Limited . . . 995
The Use of Sea Water for Public Purposes 995
Notes from Scotland 996
Current Sales of Gas Products 996
Coal Trade Reports 997

PARAGRAPHS:—

OBITUARY: Alderman John Pelton, J.P.; Mr. Henry Lyon . . 968
The Autumn Meeting of the Institution of Gas Engineers . . . 968
Explosive Mixtures of Acetylene and Air—Mr. Penney's North of England Paper—Ruscoe's New Retort-Lid Facing Machine . 969
The "James Forrest" Lecture—The Philadelphia Natural Gas Company—M. Teclu on Flame—Shifting a Large Water-Main . 971
A Petroleum Combination—Projected Acetylene Gas Scheme for New York—The Determination of Nitrites in Potable Waters—The Sulphurous Products of Gas Combustion 977
Water Gas for Birkenhead—Manchester Gas Affairs—Sales of Shares 979
The London Sea Water Bill—New Joint-Stock Companies—The Proposed Purchase of the Chichester Water-Works 981
Shoreham Water Company—The Development of the Sutton-in-Ashfield Gas Department—The Fatal Explosion at the Huddersfield Gas-Works 989
Accident at the Saltley (Birmingham) Gas-Works 990
Water Supply of North Tawton—Malton Water Supply . . . 992
Georgetown (British Guiana) Gas Company, Limited—Bombay Gas Company, Limited—The Local Government Board and the Basingstoke Water Supply 997
Tarapaca Water-Works—A Dispute at the West Bromwich Gas-Works—English Incandescent Gas-Share Company—Water Supply of Plymstock—Proposed Metropolitan Water Board . 998

EDITORIAL NOTES.

A Crisis in the Building Trades.

CERTAIN events which rendered last week memorable for those engaged in the London building trade, would serve as a text for a disquisition upon *de facto* as distinguished from *de jure* government in this land of liberty. It had been known for some time that the operatives in the building trade contemplated taking action, with the object of securing better terms for themselves; and the bricklayers, in particular, have been engaged in negotiation with the employers on the subject. In the middle of all this, the leaders of the different Labourers' Unions put their heads together; and on Wednesday last, these high and mighty gentlemen issued an edict to their subjects, requiring them to give "one hour's notice to terminate their engagements" the following afternoon, "with the exception of those em-"ployed direct for public bodies and any employers who "concede the terms demanded." This order was signed by five men, including William Thorn, of the Gas Workers' Union; and pursuant to its terms, between 7000 and 8000 labourers actually left their employment last Thursday evening. The remarkable thing in this proceeding is that the men who have taken upon themselves the responsibility of thus interfering with the "organized" labourers' pursuit of their means of livelihood, are not under any legal responsibility for their action. In the eye of the law, they are nobodies; in point of fact, they are tyrants with power of industrial life and death, which they exercise at will without answering for their action to anybody. And what is this all about? The men, tradesmen as well as labourers, asked for an advance of a halfpenny an hour on their wages; and this the bricklayers have now obtained. There was no serious difficulty in the way of getting the advance; trade having obviously revived, and work being brisk. So much was understood; but the Trade Union leaders did not content themselves with a simple pecuniary demand. They thought the occasion ripe for once more striking a blow for the old claim for "full recognition of "the Union," and the consequent exclusion of every non-society workman from employment.

This conduct abundantly justifies the position taken up as to Trade Unionism by those employers who maintain the principle of liberty of employment as being the foundation of industrial security. There is no trusting the Trade Union leaders upon such a point. They may, and for a period, and for reasons, will, endure the non-society man in their midst; but it is only for so long as they are unable to help themselves. Sooner or later the Union claims the monopoly of employment wherever it is suffered; and at any moment the employer who may fondly imagine he has found out the secret of living harmoniously with the forces of Unionism, may find himself compelled to fight for the very life of his business. The operative bricklayers have, for the time being, taken their halfpenny advance, and agreed with the employers upon the terms of a new rule, which is to provide that "if any workman's presence "is obnoxious to his fellow-workman, no strike shall "take place, but the matter shall be referred to a "Conciliation Board, which shall consist of three workmen "and three employers, with a neutral chairman, provided "always that no objection shall be made against any man "on the ground of his belonging to, or not belonging to, "any trade Society." It remains to be seen how this rule will work. The men declare that what they chiefly object to is not the non-society man in their midst, but the anti-society man. There is something in this contention; for the fanatic, among men of other views whose manners and language having not usually "the repose that stamps the "caste of Vere de Vere," is apt to be a highly objectionable person.

The case of the leaders of the Labourers' Unions is not upon all-fours with that of the heads of the tradesmen's societies. For years past, the membership of the former class of Unions has been falling off; and the 7000 or 8000 men who obeyed the behest of Messrs. Thorn and Co. on Thursday last are but a poor remnant of the army that once shouted for the same leaders at mass meeting after mass meeting in every part of London. These losing leaders saw plainly enough that there was another halfpenny an hour to be had for the asking by those of their supporters who were engaged in the London building trades. But what about afterwards? They

perceived that, with the additional halfpenny, there would descend a great calm upon their "branches," and that gratitude would not be active enough to keep their men together. Hence the necessity of making a desperate attempt—the last in all probability for some of the agitating fraternity—to bolster up the "Union Principle." The Secretary of the Federated Labourers' Council, W. Stevenson, has confessed that this is the real object sought to be attained by calling off the men on Thursday. It will fail, of course. Even the bricklayers have practically conceded the point; and what is good enough for the bricklayer, ought to satisfy the labourer. Still, looking at the gravity of the issue as affecting themselves, one cannot blame the professional Union leaders for trying to keep their heads above water. It was their last chance.

The Programme of the Meeting of the Institution of Gas Engineers.

THE attention of our readers is desired to the official programme for the forthcoming meeting of the Institution of Gas Engineers, which will be found in another column. The business meetings, as already intimated by us, will be held on Wednesday and Thursday next week, under the presidency of Mr. W. Foulis, of Glasgow, in the new theatre of the Institution of Civil Engineers, Great George Street. Several of the papers to be read are calculated to give rise to lively discussion; and the Secretary, Mr. Thos. Cole, will have prints of all papers ready beforehand for the convenience of members specially interested in the subjects dealt with. The report of the Council is published. It is a somewhat colourless statement, in which, however, place is made for a formal expression of regret that the recommendations laid in the name of the Institution before the Board of Trade Committee on the Standards of Light were not accepted "in their entirety" by the Committee. Inasmuch as the recommendations of the Committee have not, up to the present time, resulted in any action being taken in regard to the subject matter, this complaint does not possess great significance. It is possible, however, that another opportunity for discussing the point will arise in the course of the proceedings at the meeting. Considerable prominence is given in the programme to the proposed visit of inspection to the works of the Hastings and St. Leonards Gas Company; and the trip will doubtless be an enjoyable one, weather permitting.

The Last Meeting of the South-West District Association.

THE last meeting of the South-West of England Association of Gas Managers was held, on this day week, at Sherborne, under the presidency of Mr. T. W. R. White, the well-known and popular Manager of the Sherborne Gas Company, who was mainly instrumental eighteen years ago in founding the organization which he has now assisted in performing the "happy dispatch" of absorption into the Southern District Association. It would not be either gracious or correct to repeat of the disappearing Association that "nothing in its life became it half so well as the "manner of its death;" for, in its time, it has done good service to its members, and held some most instructive and pleasant meetings. It is true, however, that the last gathering of gas managers of the South-West of England to be convened by a technical society of their very own was better attended and fuller of interest than any that the Association has been able to place upon its records for several years. So obviously was this the case, that, when the scheme of amalgamation came up for confirmation by the meeting, several of the members betrayed some inclination to reconsider the expediency of taking such an irretrievable step, and raised a number of questions in regard to their prospective position, as South-Western men, in the Southern District Association. It was pointed out, however, that the time had gone by for anything but accepting, with the best possible grace, the dispositions that had been made on behalf of the now moribund organization; and this was accordingly done in due course.

The incident is mentioned here chiefly for the sake of the warning that it may give to the members of other technical societies of the same kind, which need not be named. There are many people who profess to take pride and interest in their local organizations, yet do nothing whatever, year in year out, to help their Committees and Secretaries to make the society meetings useful and creditable. Over and over again, such meetings have been really mere skeleton gatherings; and the reports of the proceedings have been anything but what they should be, having regard to the industrial area covered by the society. "A word to the wise is sufficient." But with respect to the union of the two South of England Gas Associations, now happily consummated, perhaps it may not be too late to suggest that the members of the enlarged Southern District Association might well consider the point raised at Sherborne as to their corporate title being altered so far as to mark this fresh era in their history. It cannot be denied that the surviving society is no longer the same as it was before it consented to receive this wholesale addition of membership and territory. Moreover, the words "Southern District" in the old title do not possess any definite meaning of their own. It would be an easy and a pleasing act to change these words for the more definite and dignified geographical designation of "The South of England Association of Gas "Managers," as suggested. There is already a North of England Association, to which the proposed title would be a fitting pendant.

To return, however, to the Sherborne meeting. Mr. White's presidential address was in all respects well suited to the occasion, breathing a healthy spirit of full and frank acceptance of the new conditions. There was a brief but pointed discussion, adjourned from the previous meeting, of Mr. S. W. Durkin's paper, dealing with the existing confusion among highway authorities. Then Mr. W. Stagg, of Bristol, read an able paper on "The Production of Steam "and Power," which may be described as starting from the typical boiler-testing experiments of Kennedy and Donkin, and running over most of the steam engineering problems that present themselves for solution, according to his lights, by the average gas manager. Mr. Stagg's work will be highly appreciated by all users of small power, who will be able to correct his data to suit their own circumstances, and so arrive at results which, we venture to say, will in some instances be of a surprising character. Mr. E. C. Riley, of Swindon, read a paper on "Some Experiences in Incandescent Lighting for Workshops, Sheds, and Open Spaces"—an important and timely subject, treated with the author's customary thoroughness. A pleasing incident of the after-proceedings was the presentation of a well-deserved testimonial to Mr. Norton H. Humphrys, who has served the Association admirably for eleven years as Honorary Secretary and Treasurer.

The Difficulty of the Federated Coal Industry.

AT the present juncture of affairs in the federated coal mining regions, the fate of the famous Rosebery settlement appears to be "trembling in the balance." There was a meeting last week in Westminster of the Conciliation Board, composed of representatives of the employers and the miners, at which the proposals mentioned in these columns last week, and others, were considered. It was found to be impossible to come to any agreement; and the meeting was adjourned *sine die*. In some newspapers which aim at "popularity," it has been reported that the coal owners wish to discontinue the present Conciliation Board at the expiration of its present term, which occurs on July 31 next, unless, in the meantime, both parties desire its continuance. Mr. T. R. Ellis, the Secretary of the Federated Coalowners, has issued a statement, declaring that this is not the case; and that the coalowners wish the Board to continue, with the same powers of determining from time to time the rate of wages after Aug. 1. It is the miners' representatives, according to this statement, who do not see their way to accept this proposal. They object, it is stated, to an outside Chairman, which was of the essence of Lord Rosebery's settlement; and they also object, as we observed last week, to admit that wages might, under any circumstances, be reduced below the existing rates, while preserving the possibility of advancing these rates by 15 per cent. This latter is the point upon which the recent meeting split; and it remains open. The case appears very desperate to the "Daily Chronicle"—the organ of Trade Unionism—which admits that Mr. Ellis's letter puts the case for the coalowners very well. He is charged, however, with omitting "any reference to the "fact, which has been made perfectly clear by the miner's "leaders, over and over again, that they can accept no "settlement which does not provide for a definite basis on "which wages must rest, and below which they cannot "go." This is a good example of the fatuity that inspires latter-day Trade Unionist counsels. What is the value of

stating a "minimum wage"—for this is what is meant in this connection—when it is impossible to guarantee that work shall be forthcoming at the figure? The same economical authority observes that "a reasonable way out "of the difficulty would be the definite fixing of wages at "the present standard for a period of two years after "Aug. 1 next"—that is to say, give the miners' leaders all they ask, and continue the Conciliation Board as a matter of form. This hardly seems a practical idea; but then, the moment your Socialist becomes practical, he ceases to be socialistic.

Tampering with Cheques.

Among the most important of the operations of business must be reckoned the paying and receiving of money; and it is one of the distinctive characteristics of English business methods that very great use is made of cheques in the conduct of this operation. In connection with the gas industry, as in every other branch of British commerce, more money is paid away and received in the form of cheques than in any other medium. Of late years, moreover, there has been a marked extension of this practice in regard to the transmission of small sums by post and through third parties. Not so long ago, payment by cheque was usually reserved for serious transactions, and when sums under £10 in amount had to be sent away; this was commonly done by the agency of the now old-fashioned Post Office Order. With the advent of the postal order, however, there arose the habit already mentioned, on the part of people having banking accounts, of drawing cheques for very much smaller amounts than had previously been dignified in this fashion—possibly through the spread of the notion that if it was not beneath the dignity of a Government Department to issue and honour what are, to all intents and purposes, cheques for shillings and half-crowns, the banks might do the same. These institutions, for their part, fully reciprocated the movement for popularizing cheques, so as not to be behind the Government in this regard. The greater freedom with which private cheques have come into circulation has, however, facilitated a good deal of fraud. People who write cheques do not always exercise as much care in filling them up as they would do (say) in preparing a bank-note for circulation; and consequently the way has been left open to many a forgery and misappropriation. In the course of proceedings recently taken before the Recorder of London in a case of letter-box robbery, evidence was given as to the futility of what is generally believed to be the safeguard of crossing cheques and postal orders, when these instruments come into the hands of an expert thief. An official from the Post Office stated that "in the case of crossed postal orders, stamps "were ingeniously placed over the crossing. Crossing "with an india-rubber stamp was absolutely useless, "as the marks were easily obliterated. The only "safe way was to perforate the cheque." Here a juror interposed the remark: "And that is useless, as the "holes can be filled up." The prosecuting Counsel stated that he had photographs of a large number of cheques in which the crossings had been obliterated; and that, as a result of the experiments which had been made, it was proved that any kind of ink marks, black or red, could be removed, whether made by a stamp or with a pen. He regretted to hear that even perforation was not safe; but he suggested that perhaps it would be safe so far as common criminals were concerned. The whole subject requires further consideration.

WATER AND SANITARY AFFAIRS.

The Metropolitan Counties Water Board Bill had the advantage of being well abused by Lord Tweedmouth and the Earl of Rosebery, in the course of the debate on its second reading in the House of Lords last Thursday. Lord Tweedmouth, in moving the direct rejection of the Bill, described it as meagre, colourless, wanting in originality, and distasteful to the outlying authorities. The Earl of Rosebery, who made his attack at the close of the debate, proclaimed his belief that "a more wanton Bill" had never been introduced, and expressed his concurrence in the opinion previously put forth by Lord Monkswell, that "nobody wanted the Bill." With the airy eloquence which he knows so well how to assume, the noble Earl declared that, in bringing forward this measure, the Government had "everybody against them." He challenged the Government that they did not even want the Bill themselves. The grain of truth to be winnowed out of this bushel of chaff, we take to be simply this—that the Government have brought forward the Bill in deference to the frequently expressed opinion that the water supply of the Metropolis should be in the hands of a public authority. It is not that the Government particularly wished for the Bill, but conceived that the public desired it. To assert that "nobody" wants the Bill, is practically to declare that the ratepayers of London and its suburbs are reasonably content with things as they are. Who "wanted" the Transfer Bills, which were ignominiously thrown overboard the other day? The charge of being colourless, meagre, and devoid of originality is certainly one which could not be brought against those redoubtable measures; their fault lay the other way. They had plenty of colour, representing a particular party. They were not meagre, for they bristled with special conditions; and they were decidedly original in the proposed method of purchase. When Lord Rosebery asserted that he never saw a Bill which "had less chance of passing into law" than the Water Board Bill, his Lordship certainly must have been in momentary forgetfulness of the rejected Water Bills of the County Council.

In deciding on the merits of the Water Board Bill, it has to be viewed in relation to its purely preliminary character. It does not settle the water question, but provides for its settlement. It, so to speak, lays the rails on which the train is to run. How the train is to be made up, and at what rate it is to travel, can be settled in due course. Everything is not attempted at once; but there is nevertheless a preparation for everything in the future. Certainly we are not enamoured of the Bill; but one recognizes it as a very fair attempt to provide for the settlement of a question which threatens to be the subject of an endless agitation. Lord Tweedmouth adheres to his partizan cry, that the prime object of the measure is to take the control of the London Water Supply out of the hands of the County Council. Yet it is provided that the Council shall have a majority on the Water Board. Whether the scheme of representation by which the Board is to be formed is altogether of the best, may be open to doubt. But the principle of having all interests represented is distinctly recognized, though the due proportion may not be accurately provided for. This latter point can be settled by Parliament in dealing with the Bill, though it is not likely that the Legislature will endorse the claim of Lord Tweedmouth that, out of the 30 members of the Board, as many as 22 or 23 should be appointed by the County Council. An irresistible majority of the Council on the Water Board would be much the same as giving the whole affair into the hands of the County Council at once. The argument pressed against the Water Board Bill in the House of Lords, that the authorities outside London are desirous of possessing autonomous rights in regard to the water supply, is exactly what might have been urged against the Transfer Bills. The London County Council were for buying up the water supply for all the districts included in "Water "London," and settling afterwards for the severance into local areas of the 500 square miles belonging to the outer portion. The Water Board can do the same; and the Bill provides for such a severance, so far as it may be found practicable, subject to the sanction of Parliament. The first thing is to lay hold of the entire water area, and afterwards, if necessary, to deal with it in detail. It is perfectly certain that Parliament could never grapple with the affair in any other way. The Earl of Onslow, in concluding his speech, made the remark—which is thoroughly to be justified—that whether Parliament decided to pass or reject the Water Board Bill, the action of the Government had brought the matter nearer to a settlement than it ever had been since the days when the Duke of Richmond's Commission reported on the subject. Certainly, as the Earl signified, the "seven years' tinkering" of the County Council has not served to advance the problem towards a solution.

If the present Bill fails to pass, what may be expected to follow? It is quite likely that the present session will not suffice for the carrying of the measure. Meanwhile, the water supply must be cared for; and the Bills brought forward by the Water Companies must be dealt with.

Provision must be secured for the next ten years, if not for a longer period. The statement which has just been made by Lord James of Hereford contains many very striking points; and we cannot read it without a feeling of regret that the eight Water Companies of the Metropolis are not welded into one body, so as to correct those diversities in the administration of the supply to which Lord James made pointed reference. That the County Council should take possession of the entire water supply, and be made absolute masters of it, is a proposition concerning which Lord James inquires whether it "can be "for one moment maintained?" A very extraordinary announcement has been made by one of our morning contemporaries, that the "water scheme" of the Government has undergone a "collapse." A majority of 96 against 27 sufficiently disposes of this wild assertion, suggested by the volatile and dramatic harangue with which Lord Rosebery entertained the Peers when discussing the prospects of the Bill. The real "collapse" is that of the Transfer Scheme of the County Council, extinguished by an overwhelming majority in the House of Commons.

ESSAYS, COMMENTARIES, AND REVIEWS.

ELECTRIC LIGHTING MEMORANDA.

More Central Station Statistics—The Field for Central Station Enterprise—Why there are so few New Central Station Companies—Cheerful (?) Prospects in Various Places.

THE taste of electricians for statistics is admitted by one of their best technical journals, the "Electrical Review," to be remarkably keen. It is, indeed, possible to apply to this phenomenon the well-known French saying that "appetite comes with eating;" for there is no surcease to the publication of statistical information respecting the public electricity supply undertakings of this favoured country. We have recently had occasion to draw our readers' attention to the tables relating to statutory electric lighting undertakings published by the "Electrician;" and now the same service must be rendered to the "Electrical Review," which last Friday issued a special supplement consisting of a list of electric light central stations of the United Kingdom, with synopses of the plant in use and the principal working results. It is not for us to say which is the more instructive and convenient of these rival presentments of the actual state of the statutory electric lighting industry of the country. Those who are desirous of keeping themselves posted in regard to this subject, had better make a point of procuring and filing all the official and journalistic information respecting it that transpires from time to time, because every publication of the kind corroborates or corrects the rest.

In discussing its own returns, our electrical contemporary takes the opportunity for poking a little fun at gas managers, on account of their supposed unwillingness to contribute similar information concerning their business affairs to inquirers who seek it for the purpose of compiling a "directory" of gas undertakings. Perhaps when our electrical friends have been in business long enough for the novelty of the venture to wear off, they too will look with less good humour than possesses most of them at present on the frequent "inquiry circular," with its blank columns designed to be filled up gratis for the benefit of the self-appointed collector of statistics. As it is, we notice that some central electric lighting station authorities are shy of answering the questions addressed to them with the object of getting at their industrial experience; and their number is likely to swell, rather than to diminish, as time goes on, and what seems like a fair promise in many examples turns to disappointment. Our contemporary observes that not many new central stations were opened last year. This is explained by reference to the fact that the most important towns of the kingdom are now supplied with electricity works; while the smaller towns will be slow to take upon themselves a similar responsibility. It is reckoned that there are in England alone 66 towns with populations of over 30,000, 106 towns with populations of over 20,000, and 212 towns with populations of over 10,000, wherein there is as yet no central electric lighting station. These figures ought, on their face, to keep the enterprising race of electric light touts in good heart, but for the discouraging reflections that their business prospects do not depend very closely upon population statistics, and also that the places still open for their operations are mostly like those that, having ventured into electric lighting, now sincerely "wish they hadn't."

There are notoriously at least two ways of looking at everything. Our contemporary observes: "The advantages of municipal ownership of electric lighting works are clearly recognized by the majority of local authorities; hence it is not surprising to find that the majority of electric lighting works opened during 1895 are owned and controlled by municipalities. There were not more than three stations opened by companies last year, against ten owned by local authorities." The other view of the same facts is that private investors can no longer be persuaded to put their money into fresh electric lighting ventures; whereas local authorities are still susceptible of being cajoled or frightened into spending public money upon this class of "enterprise." Our contemporary is fain to confess that "there are many works which earn no dividends for the shareholders, and many municipal stations that do otherwise than relieve the rates," though, of course, "sanguine that the majority of them will, before long, do credit to the wisdom of their sponsors." We all know of how sanguine a financial habit electricians can profess to be, especially when other people find the money.

Let us, however, cite an example or two to indicate that a little cheerfulness is badly needed in some quarters from which our electrical contemporaries draw their statistics. There is the case of the St. Pancras Vestry undertaking—a big enough thing, in all conscience, and a prosperous, as such things go. The Vestry have already spent £113,889 of capital; and this outlay, like a baby giant in a show, is "still growing." Last year the undertaking earned £18,921, in which public lighting figured for £3568. The accounts show an expenditure on revenue account of £12,346; thus leaving an apparent profit-balance of £6575. Nothing, however, is charged for administrative expenses; rates and taxes only stand for £391; and station repairs cost £1185 net. Out of the profit-balance, £3678 has to be paid for interest, and £1877 towards redemption. Not a penny is provided for depreciation; but the splendid allowance of £45 is made for "reduced value of stores." The net profit pulled out of the fire of the year's operations is £935, while the year before it was £1768. Truly, a comforting prospect this for the St. Pancras ratepayers!

Then there is the brilliant example of Kingston-upon-Thames. For 1894, there was a deficit on the undertaking of £1298; and the progress made in 1895 is chiefly apparent in the increase of this loss to £1382. The Corporation do their best to help the works. Half of the current generated is used for street lighting; and the same luxury is afforded to the sewage works and the labourers' dwellings erected by the Corporation. Did not the electrical adviser of the Corporation, Mr. W. H. Preece, declare that incandescent electricity was a poor man's light? The dream is realized in Kingston—at the expense of the poor ratepayer. For an example of company working, one can look at Hastings—not by any means a mean town, nor one in which electric lighting has lacked partisans in high places, nor bold advertisement in the local newspapers. Yet for last year there was no dividend. The Chairman is doubtful of the advantages of the Brighton system of charging for current; and he is quite sure that the much-vaunted lighting of the sea-front is a dead loss to the Company. Of course, the Company are supposed to have "good prospects" before them; but, like a rainbow, these seem always to get a little further off as attempts are made to approach them.

OBITUARY.

A vacancy has been created on the Board of the Croydon Gas Company by the death, on the 24th ult., of Alderman John PELTON, J.P. The deceased gentleman was out walking on the above date, when a sudden seizure disabled him; and he died very shortly after he had been conveyed home. He was in his 69th year.

Mr. HENRY LYON, Manager of the Gaythorn Gas-Works, Manchester, died at his residence, "Norwood," Sale, on Sunday last, in his 76th year. The late Mr. Lyon served his articles as millwright and engineer at Messrs. Galloways—the Knott Mill Iron-Works, Manchester—and commenced his career with the Manchester Gas Committee at their Rochdale Road Gas-Works, as millwright and draughtsman, about 1854. He succeeded the late Mr. W. Brown as Manager of the works about 1860. There was a break in connection with Mr. Lyon's services with the Gas Committee, from 1875 to 1885. He carried out many improvements while Engineer of the Rochdale Road works, including the introduction of the Foulis hydraulic stoker. Two three-lift gasholders, which were amongst the earliest of such holders erected, and of his own design, were placed by him on ground belonging to the Manchester Gas Committee in Newtown. He also introduced at their works a rectangular condenser-scrubber—spoken of in "King's Treatise on Coal Gas"—which proved of much service. He patented a coke and coal weighing and measuring and registering machine, which commanded a large sale. He was also co-patentee and inventor of a rotary washer, with which, however, he was not quite so successful. For the last eleven years Mr. Lyon has been Manager of the Gaythorn Gas-Works, where he was much respected by the employees. He leaves a widow, two sons, and six daughters.

The Autumn Meeting of the Institution of Gas Engineers.—Having been informed that their Engineer-in-Chief, Mr. William Foulis, M.Inst.C.E., is to preside at the forthcoming meeting of the Incorporated Institution of Gas Engineers in London, the Glasgow Corporation Gas Committee have authorized him, in the name of the Gas Trust, to invite his fellow-members to hold their autumn gathering in Glasgow, to which they will be cordially welcomed by the Gas Commissioners, and offered every facility for inspecting the extensions and improvements which have been made during the past few years at the gas-works belonging to the Corporation.

THE TRANSACTIONS OF THE INCORPORATED INSTITUTION OF GAS ENGINEERS.

THE fifth annual volume of Transactions of the Institution of Gas Engineers has just appeared; the period of incubation having been of the same duration, to a week, as in the case of its predecessor. There may be a reason for keeping back the publication of these volumes, so that every one as it comes may serve to further advertise the quickly ensuing meeting. As regards works of reference appearing annually, however, it does not, perhaps, greatly matter when they appear, so long as they are worth having. Hitherto, these Transactions have formed not the least valuable of the various justifications for the existence of the Institution as an agency for the cultivation and dissemination of sound gas engineering practice; and we have pleasure in testifying that the present volume is fully up to the standard of those that have preceded it, and that the value of most of its contents, and the novelty of some of the matter, warrant our giving it a somewhat extended notice.

Let us take the present opportunity for asking, once for all, the Publications Committee of the Council—if there is such a body—and the Secretary of the Institution and Editor of these Transactions, Mr. Thos. Cole, to reconsider the style into which they have dropped, of using the singular number, and its accessory concomitant, the neuter gender, in references to the Council. It is such an awkward form of expression, and leads inevitably into such involved and clumsy diction that no official or public body of standing now uses it. It is some years since the "JOURNAL" drew attention to the formal decision of the Government of India to employ the plural form in this connection; and the Council of the Institution will not find any organized body of men habitually spoken of as "it" in any journal or writings of the smallest pretension to good literary style. Reference to the editorial columns of any issue of "The Times," will prove our point in this regard. Where an organized body, such as a public company, or a government, are referred to as acting as so many individuals, it is contrary to good sense, as well as good writing, to use the singular form, which is, of course, permissible on occasions when the subject is referred to in the passive sense or as a single entity. There is really no difficulty in observing this distinction, as appears, for instance, in last Thursday's "Times," where, in a leading article, a Committee of the Board of Trade are referred to as "they," while the Board of Trade itself is mentioned as "it." The Council of the Institution, however, are not even consistent in their awkwardness, for in their report, referring to the Committee of the Board of Trade on the Standard of Light, they state (at the bottom of page 14) that "the Committee *has* now concluded *its* labours," and five lines further on we read that "the publication of some record of *their* work cannot fail to prove of the greatest interest." This sort of thing is extremely irritating to the reader, and should not be perpetrated by the governing body of a technical society claiming a high place among such organizations. Good literary style has never been a strong feature of the official chronicles of the Institution, but if the Council will avoid in future the particular error here exposed, they will be greatly helped in the matter of expressing themselves clearly and neatly.

It is not necessary to criticize afresh, after so long an interval, the papers published in full, with the explanatory plates and tables, in the present volume. Some of these were subjected to sharp comment in our correspondence columns shortly after their first publication in the "JOURNAL" last May. The volume will be esteemed as of exceptional value in the series, by reason of its containing Professor V. B. Lewes's historical memorandum on "The Work of the Photometric Standard Committee," with its appendix containing the report of this Committee. Not many such volumes, moreover, can be found to contain more valuable papers on gas engineering construction, illustrated in great detail. In addition to the papers read at the meeting, the Council have been able to obtain from Mr. Charles E. Botley, for publication in an appendix, an account, with drawings, of the three-lift gasholder and iron tank lately erected at the works of the Hastings and St. Leonards Gas Company. This appears to be a soundly designed, and successfully carried out job; due attention being given by the Engineer to the important considerations of simplicity of scantling sizes and sections, strength where strength is wanted, and facility for painting and keeping exposed parts in repair.

Another interesting communication given in the Appendix is a description, with drawing, of Mr. C. C. Carpenter's neat and satisfactory arrangement for supplying with coal the trolley-stages, or movable platforms, needed for the hand working of settings having retorts situated above the ordinary stoking level. To serve this purpose, Mr. Carpenter has designed a sort of two-storey coal-bin, running along the side of the retort-house in front of the settings, provided with a projecting shelf at a level which slightly overhangs that of the trolley-stage. This shelf is of such a width that the natural angle of repose of the coal, as governed by the lower edge of the top curtain or side of the bin, comes within the outer edge. Hence, while the coal does not run out upon the trolley-stage, it is always in the best position for the men on the trolley to shovel from. There are, perhaps, not very many gas-works wherein similar accommodation of an essentially troublesome system of charging retorts is needed; but anything that tends to lighten labour in an old-fashioned or cramped station, is as worthy of commendation in its way as the most elaborate contrivance for making good use of a clear and convenient space.

The third and last contribution to the Appendix is a characteristically modest description by Mr. James Stelfox of his system of "crossing-boxes," originally designed by him for a set of scrubber connections at Belfast, to obviate the disadvantage of having a double tier of mains when it is necessary for two or more independent lines of connections to cross one another. This arrangement, simple enough when one is shown how to do it, has been adopted in several works where purifier connections are kept above ground. So far as we are aware, Mr. Stelfox was the first to solve the difficulty of crossing mains by the adoption of the expedient of making one pass through a jacket formed out of the other. It seems an obvious device; but it is just these inevitable arrangements that are the longest in being hit upon.

The remainder of the Transactions is made up of "Abstracts of Papers Published in Various Chemical Journals, &c.," as to which the comments we made upon the corresponding portion of the previous volume may be repeated, with emphasis. They are absolutely stale, poor, and worthless to anybody who subscribes to, or can get a sight of, a technical periodical—to say nothing of the "JOURNAL," wherein all of them, and many more of equal value, have been published at greater length and a long time ago. We do not desire to discourage the Council in their well-meaning attempt to copy, at some distance, the work of the secretarial staff of the Institution of Civil Engineers. But if work of this kind is worth doing at all, it is worth doing well. There is a good deal of printed matter more or less bearing upon gas engineering, for instance, which comes to us from time to time from various sources, and which the exigencies of space forbid our reproducing in full, with the tables and formulæ that frequently accompany it in the original. This is the sort of matter that might find shelter in these Transactions, but would be looked for here in vain, among "tit-bits" taken from such a familiar source as the "Journal" of the Society of Chemical Industry. The sole piece of special information discoverable in these "Abstracts" is a translation from the German, given over the well-known initials "C.G.," of an article upon experiences with incandescent gas-burners for street lighting. As to this, the reflection naturally occurs to one that, valuable as the information thus purveyed doubtless is, it is a long way to go for what might have been found much closer at hand. Last year, the Institution Transactions contained what was stated to be a first instalment of a bibliography, by Mr. F. S. Cripps, of the gas literature of the world. There is no second portion of this compilation in the present volume, which is to be regretted, as a good opportunity for improving and expanding the first list is thereby lost. Moreover, as this continuation was positively promised, somebody responsible for it must be chargeable with breaking faith with the technical public.

To conclude our notice of these Transactions with a word of praise rather than of complaint, let us repeat that the volume is a good one of its series, and is a guide to modern practice that no gas engineer can afford to lack.

Explosive Mixtures of Acetylene and Air.—At a recent meeting of the Academy of Sciences, M. Gréhant dealt with the subject of the products of combustion of an acetylene burner. According to this investigator, the combustion of acetylene in an ordinary fishtail burner is complete; the products not comprising the least trace of a combustible gas containing carbon. With mixtures of acetylene and air, the most violent explosion was produced when the volume of air was nine times that of the acetylene.

Mr. Penney's North of England Association Paper.—Mr. Thomas Havelock, of Newcastle-on-Tyne, asks us to correct an inaccuracy in the report given last week of his remarks in the course of the discussion of the above paper the previous Saturday. The paragraph in question reads: "Mr. Penney showed that they (the South Shields Company) had minimized their bad debts to less than 2½ per cent." What Mr. Penney stated was that their average at South Shields was 0·33 per cent.—a most remarkable and creditable state of matters; and Mr. Havelock referred to it as being less than a half per cent.

Ruscoe's New Retort-Lid Facing Machine.—On Friday, the 24th ult., a number of gas engineers visited the Albion Works at Hyde, near Manchester, to inspect in operation a new retort-lid facing machine recently patented by Mr. John Ruscoe. The machine stands on its own bed, and has strong double-geared wheels and counter-shaft to correspond. It is made for turning up from the casting, and for refacing D and oval and other irregular-shaped retort-lids. The lid is held in a chuck, and revolves while the tool is held in a special tool-holder, which is free to move on its bearings, being guided to its work by friction-holders working in a groove in a cam of larger diameter than the retort-lid or other work to be faced. Great interest was shown in the marvellous ingenuity and skill displayed in the construction of the machine, which works easily and almost noiselessly, and was allowed to do its work in a perfectly satisfactory manner. The change from one lid to another can be made in one minute; and the same machine, with a change of certain parts, answers for all sizes and shapes now in use.

SOME CONSIDERATIONS RESPECTING LIGHTING.

An essay on "Lighting Residences by Electricity," by Mr. Augustus Noll, appeared in the "Engineering Magazine" recently; and although written from a totally different standpoint, some of the author's observations are not destitute of instruction for gas lighting engineers. The author begins by asserting that "in no class of buildings is gas for illuminating purposes being displaced more rapidly by electricity than in residences;" and he goes on to enumerate a few of the advantages claimed for electricity over gas for the lighting of private residences. "When we consider," he observes, "that not only is the sanitation and ventilation improved, but the fittings and decorations are also preserved, and that electricity's cleanliness, the absence of flame, heat, &c., and the colour of the rays, permit the use of more delicate tints and costly fabrics, to say nothing of its safety and low cost if properly installed, we need not look further for the reason of its use by the social world. As a matter of fact, in a modern residence, the decorations would sometimes be impossible if gas were used for illuminating, and, for similar reasons, the system of lighting by electricity, as now installed, could not be replaced by gas or any other known method." There is much that might be criticized, if it were worth while, in this disjointed passage, which is interesting mainly as showing that, with all their progressiveness, electricians have not succeeded in emancipating themselves from the superstitions regarding the reasons why householders should patronize their light which they formed the habit of parading in print and on the platform many years ago. Surely, it ought to be time now, if only the world were governed by reason, that people's minds were disabused of the notion that an insanitary, ill-ventilated apartment can be made healthier in the long run by any change in the method of lighting. And people who are able to afford delicate schemes of colour and costly fabrics in the decoration of their houses, do not want to be coaxed into using electric lighting on the score of its alleged cheapness. It is far better to say at once that householders who wish to be in the fashion in all things, take to electric lighting because it is fashionable. This is the truth of the matter; and the friends of gas lighting need not be afraid of recognizing the fact. At the same time, the amount of gas lighting actually lost to its purveyors on this score is probably small; for gas was never a pet of fashion. There is, however, no knowing what may happen in this respect; and the new order of gas lights and shades are so pretty that they are winning their way in places whither their plainer precursors had no chance of penetrating.

Mr. Noll informs his readers that the lighting of a first-class residence requires different treatment from that which prevails in office buildings, hotels, and the like; inasmuch as in the latter the location and number of lamps are fixed, and their uses "well understood," while in the former the lights cannot be located by general rules, but must be treated in accordance with the existing conditions. "If the residence is of the ordinary class, the usual chandeliers and side brackets are employed; but if the residence is of a high grade, the lighting will probably be an important factor in the decoration, and unless it receives proper treatment, it may mar the effect intended by the artist." But why should a good lighting effect be reserved for the rich owners of "high-grade residences?" Again, we learn: "Except in the library and the dining-room, chandeliers are now seldom used. They are economical; but, however artistic they may be, they generally obstruct the view, and are not to be tolerated." In this passage, the author uses the word artistic for ornate, because it is impossible to conceive of an artistic fitting, properly so-called, as an intolerable obstruction. Upon what evil days, let us be permitted to remark, has the lordly chandelier fallen! Nobody has a good word to say for it, yet it is only a few years ago that pages upon pages of the catalogues of manufacturers of ornamental brasswork were full of these gorgeous aids to interior lighting.

Mr. Noll states that "for general illumination in the principal rooms, an allowance of 16-candle power to each 30 or 40 square feet will be satisfactory; for chambers, &c., an allowance of 16-candle power for every 50 square feet is usual, assuming that the height of ceilings is ordinary." This is a fairly liberal allowance; and unless the electricity is exceptionally low priced, it would run into a heavy charge for lighting. It would give four 16-candle lamps to an apartment 12 feet square—a scale of lighting that would make every central station electricity supply company in the land rejoice exceedingly. As it is, they are fain to advise their customers to be content with as few 8-candle power lamps as they can conveniently do with.

The problem of lighting cathedral glass windows, domes, and similar decorative features from the back, is touched upon by Mr. Noll. This is, indeed, a point upon which the ingenuity of artificial lighting experts has not been sufficiently exercised. Mr. William Sugg may be said to have broken ground in this direction by his historic treatment of the Reading Town Hall; but very little has been put upon record with respect to further progress in what should be a very interesting system of combined interior lighting and decoration. Speaking as an electrician, Mr. Noll finds this way of lighting glass domes or stained-glass windows very expensive, "on account of the immense amount of light required." But the objection does not apply in so much force to the use of gas-lamps, with reflectors, for the same purpose. He remarks that "small domes and windows can sometimes be lighted to good advantage by one reflector, provided there is sufficient space at the back. Another way would be to form a recess on the sides at the rear of the window, in which to place a reflector throwing the light across the back of the glass." There are many public and private houses in which a great outlay has been made upon cathedral glass in staircase and other windows, and screens, which, under ordinary conditions of artificial lighting, can never be seen at all at night, when perhaps their decorative effect would be most highly appreciated, or at any rate seen by the largest number of people. When one comes to think of it, scarcely any considerable quantity of stained glazing is ever seen except by daylight. It is true that a strong light is needed to bring out the colours of cathedral glass, so that Scott's imaginary moonlight scene at Melrose, of the ruby glass of one of the old windows throwing a "bloody stain" upon the pavement of the Abbey is not, in point of fact, realizable. But this should be no obstacle in the way of obtaining the effect by artificial means. In short, there is nothing but force of habit behind the practice of always keeping artificial lights inside the apartment they are intended to illuminate. Frequently they would serve the purpose as well, or better, if kept outside.

Mr. Noll introduces us to a fresh technical term for the sockets, or fixed points of a system of interior electric light wiring, at which temporary or permanent lamp connections can be made. He calls them "outlets." A specimen of his diction may be given: "In bedchambers, a switch should be located on the side wall, and within easy reach of the bed, with an outlet directly above. This outlet and its control form a great accommodation in times of sickness and for reading." There is much more of the same character. Honestly, this facility for lighting a sick-bed by a single, safe, and conveniently-controlled overhead light, is one of the few special triumphs which we have ever felt disposed to envy the electricians. It is perhaps not at the disposal of those who need it most; but an hotel bedroom lighted in a sensible manner by incandescent electric lamps is one of the few positive luxuries which modern caravansaries have to offer the traveller, although not even the electricians have succeeded in discovering a posture for reading in bed which does not become uncomfortable after ten minutes or so.

Before concluding his essay, Mr. Noll takes an opportunity for mentioning "the various other accommodations afforded in residences by the use of electricity, such as the operation of the dumb-waiter and passenger elevator, the pumping of water, the heating of plates and of foot-warmers for invalids, imitation of open-grate fire in the hearth, the ventilation of rooms, and fans for the sick-chamber." This is carrying the matter rather far. Of course, if there are eccentric millionaires in the United States who are not content with spending their superfluous cash upon silver water-pipes and gold lavatory basins, they may as well turn their "high-grade residences" into puzzle-boxes of electrical toys, as get rid of it in more reprehensible fashions; but such fancies are not for the average householder.

The point of the whole matter is this: Electricians have introduced the well-to-do world to a new system of artificial lighting, but have completely failed to find any equally novel style of applying it to ordinary household uses. To his credit be it stated, this latest writer on the subject has not sunk to the level of advocating the employment in his "high-grade residences" of the monstrous imitation candles which are such favourites of the English electric light specialist. But he has no fresh message to deliver. It is useless to blink the fact that this is a desperately inartistic age, in regard to most things that should go to the adornment as well as add to the comforts of the modern home; and the more "scientific" the services that the progress of civilization enables the householder to command, the more questionable, from the artist's point of view, is the shape they assume. One word more, before we finish, for Mr. Noll and our Transatlantic readers generally. If the fashion of building "sky-scrapers" of some score or more of storeys in New York and other cities continues in vogue, those who deal in artificial light will have to address themselves to the satisfying of a continuous demand. There will be no daylight at the ground level for any indoor use; and it will then become a question whether the problem of artificial lighting will not have to be solved in a manner directly opposite in character to the "tower lighting" which was at one time heard of as the best form of utilization for "the light of the future." Rather will it be necessary to arrange for the lighting of streets, and the business premises bordering these thoroughfares, upon some uniform system which shall serve to make both wayfarers and occupants oblivious of their loss of daylight. In this by no means fanciful eventuality, all lighting might be done from outside the buildings. The distinction between night and day, so troublesome in a business community absorbed in the chase of the "Almighty Dollar," might then be ignored; and by an easy subdivision of the twenty-four hours into (say) three watches for continuous labour, thrice the amount of output might be got out of the same capital investment in office buildings and other fixed charges, that is possible under the effete system prevailing elsewhere.

NOTES.

The Electrolysis of Carbon.

It is reported that Dr. Coehn has informed the Berlin Electrotechnische Verein of his having successfully dissolved carbon in a galvanic cell, precipitated it again on a cathode, and so formed a lead peroxide and carbon couple which has an electromotive force of 1·03 volts. It is declared that this is the first example of the obtaining of carbon as an ion; and consequently that this carbon-consuming cell constitutes a remarkable advance in the matter of the direct utilization of carbon in the generation of electricity. Dr. Coehn states that, under suitable working conditions, he gets from his carbon 70 per cent. of dioxide, and 30 per cent. of monoxide. His platinum cathodes receive a deposit—first shining in beautiful iridescence, and soon becoming black like ordinary graphite. This deposit is not attacked by hydrochloric acid, is very slightly soluble in boiling nitric acid, disappears completely and quickly in a flame, and can be oxidized by chromic acid. Elementary analyses further proved that the deposit consists essentially of carbon; but there is always some hydrogen present. In what state the carbon passes into solution, remains unexplained.

Good Concrete Superseding Poor Mixtures.

An article in a recent number of the "Builder" discusses the subject of "what can be done with good concrete." It is remarked that the competition now is between different grades of Portland cement concrete; the inferior materials—such as grey lime, lias, and Roman cement—once largely used for structural purposes, having fallen into desuetude. A quality of Portland cement is demanded nowadays which a few years ago it would have been impossible to obtain. To take the question of fineness alone: Twenty years ago, the fineness of cement was scarcely considered. Gradually, however, more and more stringent tests have been adopted; and now for important works it is often specified that the cement shall pass a sieve of 2500 meshes to the square inch, and only 10 per cent. be retained by a sieve of 5600 meshes. Not infrequently a still greater degree of fineness is required. The same tendency may be observed in the quality of the concrete manufactured from Portland cement. A tendency to use richer mixtures for all purposes is also observable. Better concrete, and less of it, is declared to be the modern rule. The success of the Monier system, in which one part of cement is used to three parts of aggregate, and iron rods are also employed to give increased tenacity, is cited as a proof of the advantages of employing better concrete than was formerly considered economical. Nearly all the well-known makers of artificial flags and paving adopt a rate of either 1 to 2 or 1 to 3 for cement and aggregate. The large proportion of cement renders the concrete more uniform in substance, and therefore in strength; and it becomes possible to calculate beforehand the strength of a structure with some degree of accuracy. When concrete containing a large proportion of sand and aggregate is used, it is impossible to insure such a thorough mixing of the ingredients as to produce uniformity of substance; the sand and the cement will be more or less unequally distributed throughout the mass, and the strength of the structure will be determined by the weakest part. The general lesson sought to be conveyed is that a smaller quantity of good material will fulfil the office of a larger quantity of bad; and as a lower factor of safety can be used with the former, the saving of material is more proportionately than the difference in strength of the two materials would seem to allow.

The Red Colour of Coal Ashes.

The subject of the cause of the red coloration of some coal ashes, was recently discussed at a meeting of the American Academy of Natural Sciences, with reference to the apparent capricious distribution of iron oxide as colouring matter in the rocks of the anthracite coal region of Pennsylvania. At several points, apparently, the accessible supply of iron was exhausted by complete distribution in the strata under process of deposit with intermediate and subsequent periods during which new supplies appear from some source not yet clearly explained. Professor A. P. Brown observed that it had been suggested by Russell that the red colour of certain formations may have originated from the subaërial decay of iron-bearing rocks, and the subsequent deposit of this material as sediment forming the red rock. So far as the ash of the coal itself is concerned, it is considered probable that the colour is due to the way in which pyrites is contained either in the coal itself, or in the slate adjoining. Coal containing separable pyrites, would give white ash; while if the pyrites is intimately mixed in the coal, the resultant ash will be red.

Dr. Henry Morton on the Rontgen Rays.

Discussing the Röntgen rays, Dr. Henry Morton, of the Stevens Institute of Technology, remarks that there are a number of facts long known, which in some cases seem to be forgotten, and which, while in no way detracting from the originality and merit of this discovery, yet need to be considered in order that its true characteristics should be recognized. Thus, to begin with, it is not new that invisible radiations obtained by electrical discharges in Geissler tubes and elsewhere should produce photographic and fluorescent effects. Among other observations upon this part of the subject, Dr. Morton states that in 1872 he had the good fortune to discover in, and extract from, certain dense and tarry petroleum distillates, a hydrocarbon to which he gave the name thallene, which possesses the property of fluorescence in a pre-eminent degree. It was exhibited in the course of a lecture in Philadelphia, in the same year, when a screen or curtain of muslin of the same tint of yellow as thallene was prepared, upon which was placed a design of a wreath of leaves, made of paper coated with thallene. Seen by gaslight, this design could not even be perceived at a short distance; but when the rays of a powerful electric light, sifted through a dark purple glass, were thrown upon it, the design fairly blazed out in vivid green on a background which looked as dark as black velvet. Here, then, we see that, prior to Röntgen's experiments, it was well known that certain practically invisible rays could produce visible effects through the action of fluorescence. What Röntgen has added to this is the knowledge that such rays are developed in peculiar abundance in the highly-exhausted tubes known as Crookes tubes; and that they will penetrate with unexpected facility a great many optically opaque substances.

The Substitution of Iron for Lead Water-Pipes.

It appears that in the United States a tendency has become manifested for the substitution of wrought-iron for lead water-pipes. The question seems to have been raised in some of the technical journals as to whether this alteration might be regarded as an improvement, like the substitution of iron for compo. gas-piping in buildings. The general agreement of good plumbers is, however, to the effect that the circumstances in the two cases are different, and that, except for buildings of exaggerated height, iron water-pipes are no improvement upon lead, but rather the contrary. Lead water-pipes are of uniform bore, and present a minimum resistance to flow. Wrought-iron pipe is not of uniform bore. Its fittings are made at angles of 45° or 90°; and a fall which will enable iron pipes to be readily emptied when water is shut off, is difficult of attainment. As all fittings used on wrought-iron pipe are of larger diameter than the pipe itself, it is obvious that it is absolutely impossible to thoroughly empty a system of such piping throughout a building, when once filled with water. Galvanized pipe is more dangerous to health than black iron pipe. All palatable natural waters contain carbonic acid, and many contain chlorides or sulphates, all of which attack zinc more or less readily, especially when warmed. Hence it is reputed to be particularly dangerous to health to make use for dietetic purposes, of hot water from a galvanized range-boiler in the kitchen.

The "James Forrest" Lecture of the Institution of Civil Engineers will be delivered on Thursday next, by Dr. A. B. W. Kennedy, F.R.S.; the subject being "Physical Experiment in Relation to Engineering."

The Philadelphia Natural Gas Company have completed a gas-line to the West Virginia fields, which has been under construction for more than a year. The officials believe that the Company will be able to furnish Pittsburgh with a supply of natural gas equal to that of 1888, when the Murrayville field was at its best. As from April 1, new contracts aggregating 5 million cubic feet of gas per day went into effect. The financial year of the Company closed on March 31; and a statement covering the operations of last twelve months is in course of preparation. While the past year is not expected to show much improvement over 1894-5, sanguine predictions are being made as to the earnings of 1896-7.

M. Teclu on Flame.—In the "Journal für Praktische Chemie, M. Teclu continues his contribution on the subject of "Flame." With regard to the colour of flames, the author remarks that, besides the luminous action of the ignited carbon liberated, the primary colours yellow and blue are distinguished, though not in a decided state of purity, from which, since the yellow occurs reddish, the mixed colours violet and green are produced in various shades. The yellowish-red tone of colour is due to the hydrogen flame; and the bluish colour, to the flame of carbon monoxide. These flames interpenetrate each other. The violet coloration of the margin of the flame is produced by the reddish tone of the hydrogen flame, and the bluish tone of the carbon monoxide flame.

Shifting a Large Water-Main.—Particulars are given in a recent number of the "Engineering Record" of the shifting of a large water-main in Boston (Mass.) The construction of the electric railroad subway through one of the streets necessitated many changes in the positions of the water and gas mains previously laid there; and on the 30th ult., the Superintending Engineer (Mr. H. C. Richardson) succeeded in shifting as one piece 300 feet of 30-inch cast-iron water-main to a line 18 inches from its original location. A trench 6 feet deep and 8 feet wide was first necessary. The pipe was then cut at both ends, and cross-beams and jack-screws placed at intervals of 15 feet, and the main swung to these with heavy chains. When all was ready for the shift, the screws were turned in unison until the main had been elevated from 1 to 3 feet, when it was shifted along timbers set on rolls to its new position, and re-connected. Sixty men were engaged in the operation, which took about sixteen hours for its completion.

TECHNICAL RECORD.

THE INSTITUTION OF GAS ENGINEERS.

The Programme for the Forthcoming Meeting.

The programme of arrangements for the meeting next week of the Institution of Gas Engineers has now been issued; and, as already intimated in the "JOURNAL," the first two days' meetings will be held at the Institution of Civil Engineers, Great George Street, under the presidency of Mr. William Foulis, M.Inst.C.E., of Glasgow, and the third day will be devoted to an excursion to Hastings.

The proceedings will commence at 10.30 on Wednesday; the first business being the presentation of the annual report of the Council, as follows:—

The Council has again the pleasure to record, in its sixth annual report, a continuance of the prosperity which has attended the Institution since its formation.

Though the progress of the Institution is a steady and regular one, the Council wishes to draw attention to the desirability of members bringing under the notice of managers and others holding responsible positions, whether in large or small works, the advantages to be gained by becoming either members or associates.

The Council regrets that the recommendations contained in its third annual report, which were laid before the Committee appointed by the Board of Trade to consider the Standards of Light, have not been accepted in their entirety by that Committee.

The autumn meeting at Liverpool was an unqualified success; and the Council desires to express its high appreciation of the hospitality extended to the Institution by Mr. William King and the Directors of the Liverpool United Gas Company.

By the painstaking kindness of various contributors, the appendix papers continue to be a useful feature of the volume of "Transactions;" and the Council, in expressing the thanks of the Institution to those who have already furnished communications, asks the co-operation of all members and associates, especially those controlling small or medium-sized works, in contributing drawings and descriptions of gas-works plant.

CHARLES C. CARPENTER, *President.*
April, 1896. THOMAS COLE, *Secretary.*

The report of the Scrutineers as to the election of new members, &c., will then be taken, after which the President will deliver his Inaugural Address. The papers that will then be read and discussed are: (1) "Notes on Residuals," by Mr. Charles Hunt; (2) "The Efficiency of the London Argand at Different Rates of Gas Consumption, with Special Reference to its Use as a Gas-Testing Burner," by Mr. Lewis T. Wright. The annual dinner will take place at the Holborn Restaurant the same evening, at 7 o'clock.

On Thursday morning, the reading and discussion of papers will be taken, in the following order: (3) "Incandescent Gas Lighting," by Professor Vivian B. Lewes; (4) "Gas—its Measurement in Relation to Temperature.—A Question for Consideration," by Mr. George Livesey; (5) "The Application of the Expansion of Fluids to the Correct Measurement of Gas," by Mr. W. Fiddes; and (6) "Coal Gas Enrichment," by Mr. A. F. Browne.

On Friday, the members will leave Charing Cross Station (South Eastern Railway) at 9 o'clock for Hastings; and on arrival will at once proceed to the gas-works, where they will be received by the Engineer (Mr. C. E. Botley) and his staff, and conducted over the works. For the information of members, the following particulars as to the works have been compiled: "The Hastings Gas-Works possess many points of interest, not only from their situation now, but as an example of works which have been re-constructed several times on the same site, as enlargement became necessary. At the present time, the works are in a state of transition for an ultimate make of three million cubic feet per day. Attention may be directed to the gasholders, which have all been erected recently, and to No. 3 in particular, which has a steel lining placed inside the original cast-iron tank, owing to the wrought-iron bands surrounding it having given way and being very difficult to replace. This holder has an original type of guide-framing; and the inner lift of the holder rises above this. Carburetted water-gas plant is also in course of erection, on somewhat novel lines, as regards arrangement. There is also a small but complete electrical installation, sulphate of ammonia works, special apparatus designed for dealing with naphthalene troubles or enrichment, a complete laboratory, and new offices and show-rooms. The retorts are all 22 in. by 16 in., oval ⌂, 20 feet long, set in beds of sixes, which give very good results; but it is ultimately proposed to fit up No. 3 house with machinery and regenerative furnaces. The coal used is principally Newcastle; being shipped to Whitstable, conveyed thence by rail, and carted into the works. Owing to the geographical position of Hastings, and the town dues on coal, it is expensive compared to other similar towns." After the inspection, the members will be invited to luncheon by the Directors of the Hastings and St. Leonards Gas Company; and subsequently conveyances will be provided for a drive along the sea-front to St. Leonards and through the surrounding country. Trains will leave Hastings at 6.0 and 7.15 for the return journey.

SOUTH-WEST OF ENGLAND ASSOCIATION OF GAS MANAGERS.

The Half-Yearly Meeting of this Association was held last Tuesday, at Sherborne, under the presidency of Mr. T. W. R. WHITE, the Manager of the local gas-works. The attendance of members was larger than on any occasion during the past four or five years; the fineness of the weather, the popularity of the President, and the fact that the meeting was likely to be the last one of the Association as a separate body all contributing to the increased numbers. On the arrival of the members, they were received by the President in his house on the works, and there hospitably entertained. For a town of equal size, it would be difficult to find in the South-West district a gas-works more completely equipped than those at Sherborne; and consequently they were subsequently inspected with much interest by most of the members.

The meeting was held in the afternoon in the Wesleyan Schools.

The HONORARY SECRETARY (Mr. Norton H. Humphrys, of Salisbury), having read the notice convening the meeting, presented the minutes of the meeting at Barry in September last, and they were confirmed.

WORDS OF WELCOME.

The PRESIDENT announced that one of his Directors—Mr. John Hall Dalwood—was present, and would say a few words of welcome to the members.

Mr. DALWOOD said that the Directors of the Company were delighted to find that the Association had chosen Sherborne for their meeting on this occasion. The town was small; but he believed they could say that the gas-works were no disgrace to the industry. This was not due to the directorate of the Company, but to the Company's Manager. He was pleased Mr. White had been chosen by the members as their President, as it showed his Directors that not only had they great faith in him, but that the members of the Association had also.

The PRESIDENT thanked Mr. Dalwood, on behalf of the Association, for the cordial manner in which he had received the members; and said he hoped that the relations existing between all managers and gas companies were of the same character as those subsisting at Sherborne.

THE AMALGAMATION WITH THE SOUTHERN ASSOCIATION.

The PRESIDENT said the next business on the *agenda* was the amalgamation of the Association with the Southern Association. The members had received from the Secretary the scheme of amalgamation. This had been well threshed out by the Committee appointed at the last meeting, and by the Committee of the Southern Association. The representatives of the Association were received by those of the Southern Association in the most courteous manner. At the conference, they found that they had nothing contradictory to each other—nothing to fight about, but that they had everything in common. Consequently, the amalgamation scheme, as far as they had been enabled to place it before the members, had been one that had met with the sanction of both Committees. He took it that the Committee appointed, having arranged the scheme, and the Southern Association having already accepted it, it merely rested with their own Association to confirm it.

Mr. P. THOMAS (Wellington) asked the amount of the credit balance.

The HON. SECRETARY: About £52.

Mr. W. STAGG (Bristol) inquired what was to be the name of the amalgamated Association.

The PRESIDENT replied that there was no proposition to alter the name of the Southern Association.

Mr. STAGG: It seems to me that it is simply absorption.

The HON. SECRETARY, replying to Mr. E. C. Riley, said there were about 70 members in their own Association, and about 100 in the Southern.

The PRESIDENT, in answer to a further question, explained that during the year the Southern Association held two meetings in London and had an excursion in May. There was no reason to suppose that the South-West district would not have the same consideration shown it as the South-Eastern counties had already received. Their experience had been that the nearer their meetings were held to London, the better attendances they had. He moved that the scheme of amalgamation be ratified.

The HON. SECRETARY read the scheme as follows:—

1. As soon as possible after June 1, 1896, a list of all members of the South-West Association who are clear on the books to Aug. 31, 1896, shall be prepared; also a statement of accounts showing the balance in hand after paying off all liabilities.

2. Such list and statement shall be signed by the Hon. Secretary and the Auditor, and accepted by the Southern Association as a correct statement of the affairs of the South-West. On receiving the cash-balance, the Hon. Secretary of the Southern shall accept and enter the names on the list as members of that Association.

3. The names so accepted will be considered clear on the books of the Southern to Dec. 31, 1896, but will immediately be entitled to full members privileges, save and except the receipt of a copy of the District Association Proceedings for 1896.

4. On completing these arrangements, the South-West Association will cease to exist.

Referring to the third clause, the Hon. Secretary mentioned that it had been the practice of the Southern Association to present their members with a copy of the "Reports of Gas Associations;" and when the South-West members had duly become members of that body, they would also be entitled to this privilege. He did not, however, think it would be fair that they should claim to receive the reports for 1896—that was, the volume that would be published early in 1897—considering that they would only enter into the Association somewhat late in the year. He did not think there could be any question on that point. The Committee had been most anxious to do what was fair to the members and to their friends. There had been no hard-and-fast bargaining, but a mere friendly arrangement between the two bodies for their mutual benefit.

Mr. D. IRVING (Bristol) seconded the motion. In doing so, he said he might point out that the broad question of amalgamation had been already approved at the last general meeting; and the subject for consideration now was the scheme that the Committee appointed by the members to represent them had drawn up. This scheme had been further submitted to the General Committee; and it now came before the members as their unanimous recommendation. It might be explained that their representatives received the most courteous and gentlemanly treatment at the hands of the Committee of the Southern Association. There was every desire to meet and concede all that was reasonable; and the fact that there was no disagreement upon any question, showed how reasonable were all the propositions from either side. They simply needed to be stated to be agreed to; and he earnestly trusted that, if the resolution was carried—as he had no doubt that it would be—the amalgamated society would be in every way a true amalgamation, notwithstanding that they had determined to retain the title of "Southern." This was decided because it was thought that it fully comprehended all the Southern counties; and where there was no advantage in making a change, they were all most anxious that none should be made. He trusted the amalgamated society would continue to do good work; that the amalgamation would prove beneficial to all the members of both Associations; and that the members of the South-West Association would render loyal assistance to the amalgamated body. He could assure them that they would receive a hearty welcome from the members of the Southern Association when they met.

Mr. H. F. VINCENT (Frome) inquired why, seeing that the Association were about to hand over their cash balance to the Southern Association, the members would not be entitled to receive a copy of the volume of Association Reports.

It was explained that the amalgamation would not be effected until practically the end of the year; and therefore it would be unreasonable to expect the volume. It was also mentioned that the Association would take into the amalgamated society exactly the same capital per member as the Southern Association now possessed.

Mr. E. C. RILEY (G.W.R., Swindon) remarked that he was in thorough accord with the general principle of amalgamation; but he was not quite satisfied that the usual privileges of amalgamation had been recognized. He rather thought Mr. Stagg's word "absorption" was more like the expression that should be used in this matter. In the first place, he presumed that if, as gas managers, they were to make application for admission individually to the Southern Association, unless there was some grave reason, most of the gentlemen present would be accepted as members. He believed it was a fact that several gentlemen who were members of the South-West Association were also members of the Southern. Then as to the name of the amalgamated body. It seemed to him that possibly, if it was the general feeling of the members, there might be some recognition of the blending of the two groups in the name of the joint Associations. He admitted that the Southern Association had a larger proportion of members; but the South-West had about 70 per cent. of the other, which was a sufficiently large accession to be recognized. Could not they ask the Committee to act for them again in this matter, and do something in the way of blending the name—say, the South and West Association? There was another point. The Committee governing the enlarged body would still be the Committee of the Southern Association; and although the South-West would bring in 70 members against 100, there was to be, as he understood, no additional representation on the Management, and the officers of the Southern would continue as the officers of the joint Association. Could nothing be done to recognize the union of the two Associations in some modification of the name, and by adding to the Southern Committee the members of the South-West Committee?

Mr. S. W. DURKIN (Southampton) pointed out that, as the ex-President of the Southern Association, he was still on the Committee.

Mr. STAGG cordially approved of the amalgamation; but he still thought that "absorption" was a better term to apply to the arrangement that had been made.

A question was raised as to the number of members present at the meeting last year when the Committee were appointed to enter into this matter; but it was pointed out that all the members received a notice of the meeting, and that they were informed by the *agenda* that the subject would be considered.

Mr. IRVING reminded Mr. Riley that the terms of the amalgamation had already been agreed upon between the representatives of the two bodies, and had been confirmed by the members of the Southern Association. It would therefore occasion some difficulty to re-open the question.

Mr. RILEY assured Mr. Irving that there was no question of any reflection upon the Committee; but if the terms were so rigidly and inexorably fixed, why, he asked, come to the Association for confirmation. He had no doubt every one of the members was prepared to vote in agreement with the amalgamation; the simple point raised was whether some recognition could not be made of the amalgamation in the directions he had suggested.

Mr. DURKIN observed that he knew somewhat of the feeling of the Southern Association; and he was afraid Mr. Riley's proposals would meet with a direct negative.

Mr. J. LOWE (Weymouth) thought that Mr. Riley had made a little too much of the name of the joint Association, and also of the question as to the representation on the Committee. They were uniting themselves to an Association remarkable for their business habits, and who conducted their work on the best possible lines. They might feel assured that, in going over to them, they would receive justice at their hands.

Mr. RILEY asked to be allowed to make a slight modification in his proposal. Instead of suggesting that the joint Associations should be called the South and West, he would propose that it be named the South of England Association. This, he was sure, would not be considered by the Southern Association as anything like presumption on the part of the South-West body.

Mr. F. G. COCKEY (Newport, I. of W.) seconded the proposal.

It was suggested that the motion for the adoption of the scheme of amalgamation and Mr. Riley's proposition should be voted upon separately; and on this being done, both were unanimously adopted.

The PRESIDENT then read the following

INAUGURAL ADDRESS.

Gentlemen,—I am very pleased to welcome you to the ancient town of Sherborne for the third time, but very much regret you should have elected me to fill the presidential chair of the South-West of England District Association of Gas Managers for the second time—feeling that, being Manager of so small a works, my position scarcely warrants your choice. Anything I may be expected to speak about of interest to you in the special subjects of our industry, has been treated by Presidents of kindred Associations so recently that there is no chance for me to say anything new or novel. You must therefore be content with the commonplace; and as we have so much business to get through to-day, it is not my intention to tire or plague you with a long address.

It is a matter for mutual congratulation that the gas industry still keeps itself well to the front, and that our undertakings throughout the kingdom rank "A1" in the money market, notwithstanding the past and present keen competition of our rivals, electricity and oil. Success in the past ought to, and must, be a guarantee for the future; but gas managers must not rest contented—they must be abreast, and keep abreast, of the times, and continually be up and doing.

The coal market seems in a state of quiescence; but our past experience teaches us we must not take things for granted, as it does not need much to produce a spasmodic upheaval, which immediately disturbs the existing relations between masters and men, and the colliery proprietors and ourselves.

It is understood that the past mild winter has seriously affected the consumption of gas; having either checked or reduced it in nearly every town. The sale of coke has also suffered, as evidenced by the mountainous heaps of coke in many works, and the invasion of other districts in order to secure sales at ridiculously and ruinously low prices. Sulphate of ammonia still remains a drug in the market; sales only being effected at about one-third of the price some of us secured in the roseate days when sulphate of ammonia well paid for manufacturing it.

Mechanical stoking in medium-sized works seems to be making rapid progress, as well as the erection of sloping retorts. West's stoking machinery has been introduced, and is now in use in two works in our district—viz., Plymouth and Torquay. Mr. Beynon, of Torquay, who is with us to-day, will, if time permits, be very pleased to give a short account of his experience during the recent winter.

In the condensing, scrubbing, washing, and purifying of gas, I feel that I cannot occupy your time with any remarks of mine that would be in any way useful or interesting, as on all and each of these subjects so much has been said and written at different times by gentlemen who have carried out exhaustive experiments, and have given us their experience in tabulated results. We must, however, be careful to have our gas well and thoroughly condensed, scrubbed, and washed, so that no particle of tar shall be carried forward to the purifying material. Complete purification in closed vessels is still consigned to the limbo of the future.

The winter of 1894 and 1895, with the mercury so many degrees below zero, was attended by great inconvenience and consequent expense. It taught us many lessons. All pipes exposed and likely to be affected by frost must in the future be

carefully protected; in the construction of gasholders, the bottom, hanging, and cup plates should be much heavier in gauge than has been customary; all telescopic holders should be provided with anti-freezing apparatus; all mains and services must be laid sufficiently deep in the sub-soil, and protection must be given where pipes are likely to become wet or at times surrounded with water; and all meters where the average meter system is in use for the supply of the public lamps must be carefully tended—special provision being made to ensure a proper proportion of glycerine being mixed with the water.

The introduction of the incandescent system of lighting in street-lamps has already received a fair amount of attention at the hands of some gas engineers, who are bringing, if they have not already brought, it to a successful issue. We must look on this from our point of view as a great boon, inasmuch as it has already checkmated the inroad of electric lighting, and in some instances has superseded it. I think it is the duty of every one of us to make practical tests of incandescent burners in street-lamps, so as to be assured, in our own minds, of the practicability and economy of the system. Our Town Surveyor has reported to the District Council in favour of the system, as effecting a saving in gas consumption of 25 per cent.—without taking any credit for the additional and superior illumination of the streets or spaces. I have used them, with the proper glass bulb and fittings, as recommended by the Incandescent Gas-Light Company, for 185 days and nights without any breakage or necessary renewal of mantles. Try the system for yourselves; and then I feel persuaded you will be able to report progress.

I have often thought it would be beneficial to gas companies and local authorities owning gas-works if an arrangement could be made for offering second-hand apparatus through the medium of a gas paper representing our industry—say, quarterly. Firms erecting new plant will not take the apparatus that may be supplanted on gas-works; nor do I see that they can be expected to, any more than we can expect our tailors to become purchasers of our left-off suits.

I hope to see the standardizing of meter unions, and the reduction in sizes for inlets and outlets, so as to render interchange easy and cheaper than under the present system.

I cannot close these remarks without feeling that it is my duty to express my regret that this is possibly the last time you will meet as the South-West of England District Association of Gas Managers. This Association was born at Sherborne; and as it often happens with persons of wealth or dignity, the place of birth becomes the most fitting place of sepulture, so, unfortunately, with the South-West of England District Association of Gas Managers. That our Association has done much useful and most practical work in the past is unchallenged. We have had men on our roll of members who have possessed real grit—men who have been respected and looked up to by their professional brethren, respected and honoured in the towns in which they resided, and have successfully carried on the undertakings under their charge. I will not mention names; but memory compels us to do them reverence. With regard to the future, the Committee appointed by you to carry out the amalgamation scheme with the Southern District Association of Gas Engineers and Managers have done their best; and it is hoped that, as far as we can, we shall, in our enlarged Association, be more useful in the future than we have been in the past. The proverb has it that "Union is strength;" therefore the Southern Association may claim importance. Let us not allow any alienation to crop up or take place; but let us try to increase and broaden our sympathies and interest in Association work. Do our duty as members, come forward with papers, and join in discussions, then we shall be better fitted for the responsible positions we occupy, and be the better able to discharge our obligations to the consumers, the shareholders, and the Directors in the various towns represented here to-day.

Mr. F. G. Dexter (Winchester) proposed, and Mr. P. Thomas seconded, a vote of thanks to the President for his address; and it was heartily agreed to.

The adjourned discussion on the paper read by Mr. S. W. Durkin (Southampton) at the last meeting was then taken. The subject of the communication was—

The Want of Mutuality between the Various Authorities Using the Sub-Soil of Public Roads.

Mr. N. H. Humphrys (Salisbury) said he believed Mr. Durkin's paper was in every sense one for the times. He did not know whether any of the members had noticed the accounts of an accident which happened in New York some few years ago, and which might follow the occupation of any public road by a number of companies. They had eight different systems in the street in which the accident occurred—a high-power steam supply, a 3-feet gas-main, a water-main of about equal size, an electric light conduit, and two or three other things. He believed it was the electric light conduit that went wrong in the first place; and an electric arc was created which acted on the gas-main. This was broken; and the gas, of course, escaped, and flared out, as it would do from a 3-feet main. The water-main became damaged; and then the high-pressure steam started—producing altogether a kind of volcano in the road. This illustrated the fact that when an electric light conduit or anything else was put down in a roadway, it increased the responsibilities of everybody else who was there before. If there were six or eight different conduits in a road, it stood to reason that there must be more risk than if there were only one or two. For this reason, he thought that Mr. Durkin's paper was one of a most important character, to which they, as gas managers, would do well to give their serious attention—not only with regard to the present, but the future developments that they might see. It was most desirable there should be an understanding between the different authorities using public roads for conduits.

Mr. F. G. Cockey (Newport, I. of W.) remarked that he had recently been suffering from the opening of roads by the local authorities. He had no doubt that gas suppliers were themselves sinners to a certain extent. He had had the "satisfaction" of seeing his gas-main suspended for several hundred yards through the laying of a sewer; and he expected trouble next winter. He thought the question under consideration was one that might be taken up by one or other of the Gas Institutions; or an arrangement might be come to with the Association of Municipal Engineers for the drawing up of a set of rules, which might be submitted to the Councils of both Gas Institutions, and possibly afterwards confirmed by Parliament. The present state of things was very unsatisfactory indeed. No one seemed to have any authority to direct where mains should be laid, or to prevent other people coming and undermining and suspending those already in position.

Mr. F. G. Dexter (Winchester) referred to certain difficulties they had experienced in his town, owing to the fracture of a gas-main by a steam-roller or some other heavy weight. The gas, he said, leaked into a broken drain, extending under one of the destructor lamps. This caused an explosion, which lifted up a considerable stretch of the roadway, and did other damage. The Corporation at that time rather expected to make the Company responsible for this result; but the latter succeeded in "turning the tables," and practically had to give the Corporation notice that they would refuse to supply gas to these destructors unless such means were adopted in connection with the burners used in the destructors as would render them perfectly fire or explosive proof, so that the flames would not ignite any explosive mixture that might come in contact with the burners. Regarding Mr. Cockey's remark that nobody seemed to be able to control or direct the operations of main laying, that was not exactly his (Mr. Dexter's) experience. The Winchester Corporation, some eighteen months ago, intimated to his Company, in accordance with certain powers they possessed under their Act, that the Company would be compelled, and they were required, to supply to them, before any work was carried out, a complete plan of the roadways it was proposed to open, the size, capacity, and position of the mains it was intended to lay, and what obstacles (if any) they expected to cross, and how it was proposed to cross them. This information had been furnished regularly; but at the same time it gave the Company a certain standing. Cases had occurred since where the Corporation had opened the ground, and come across the Company's main, and had not endeavoured to support it in a manner which was altogether satisfactory to himself as the representative of the Company. They had consequently given them the necessary notice that the method of supporting the main must be altered so as to agree with the Company's wishes, and that any damage they might cause would be at their expense. This had frequently been recognized by them. He thought that, if a gas manager took steps, some friendly understanding might be come to with the representative or surveyor of the local authority that the company would, under all circumstances, write to the surveyor that "we propose to do so and so, and we shall be pleased if you will appoint some person to examine this work as it goes forward." This would lead to a friendly, reciprocating feeling; and the Company would receive, as their due, notice when the Corporation were going to open the streets, or give any other person power to do so.

Mr. Irving said he should like to emphasize Mr. Cockey's suggestion that this subject was one that should be not only talked about, but that required some action. Seeing that both the national Institutions were not completely representative, he did not think that the Association to which they now belonged could do a better work than appoint a Committee upon this subject to draw up some rules, and to take means of getting them carried into enactment. It was all very well to have an understanding with the surveyor in small towns; but in large places, where they had not only to deal with the borough engineer or surveyor, but a dozen out-districts, it was almost impossible to have such friendly intercourse and courtesy shown one to another as was possible in small towns. However, it seemed to him to be absolutely essential that gas companies at least out of the numerous authorities using roads, should have some kind of protection. The great improvements that were being made in roadways—the rapid introduction in the large towns of wood pavement, and the cementing entirely of the surface of the roads—led to danger in many ways, if there was any fault underneath. If Mr. Durkin would undertake to bring this matter up and move a resolution at the next meeting of the Association, for the appointment of a Special Committee, he would be doing the gas industry a great service.

The President said the subject of Mr. Durkin's paper was an important one. He was one of those managers, however,

who got on very well with the surveyor; and they did not clash very much in the matter of opening the roads. He agreed with Mr. Cockey that it was very unfortunate when they found their mains unsupported from one side of a trench to the other, or suspended by a chain. A few years ago, the authorities in Sherborne relaid a section of sewers; and the result was that, in the following winter, the Company had a large increase in their unaccounted-for gas. And, what was worse, the gas entered the houses from one end of the street to the other. The ground had to be re-opened, the main followed up the whole length, and the joints recaulked. At the same time, these operations were a nuisance to the whole of the inhabitants in the street, who did not forget to speak about the inconvenience to which they were put.

Mr. DURKIN, in replying upon the discussion, said the subject with which his paper dealt covered a good deal of ground. Since the paper was read, he had brought the matter under the notice of his Directors; and they thoroughly supported him in the matter. The Southampton Corporation were officially communicated with—their attention being drawn to the fact that the roads were frequently opened in various parts of the borough without the Company knowing anything about it, and consequently their mains were liable to breakage. If the ground was filled in improperly, and the consolidation was loose for some time, possibly the water-main would get fractured and subside, and then the gas-main would gently follow suit. The Corporation replied that instructions had been given in both the Borough and Water Engineers' departments that notice was to be given to the Company of any streets that were to be opened. It was to be understood, however, that the Corporation did not consider themselves under any obligation to do this; but they did it out of courtesy. He therefore thought the Company had scored a point. The Corporation had commenced spending something like £40,000 in re-trenching the borough proper; and they had already started exposing the leading and lateral gas-mains. He had called the attention of the Surveyor to the position of these pipes—some of them being close to the side of their deep trenches, and others passing them at an angle. In a letter received from the Surveyor in reply, he said he had given instructions for every precaution to be taken, and the mains properly supported; and, with care and constant supervision, he (Mr. Durkin) hoped they would not meet with any great disturbance of the pipes after the ground was filled in.

Mr. W. STAGG (Bristol) then read a paper entitled "The Production of Steam and Power," and was followed by Mr. E. C. RILEY (Swindon) with one on "Incandescent Lighting for Workshops, Sheds, and Open Spaces." Time did not, however, permit of discussion on either paper; but both of them will appear, in due course, in our pages.

VOTES OF THANKS.

Mr. R. BEYNON (Torquay) said he felt sure he was expressing the sentiments of every member present when he said that the papers that had been read were most valuable ones; and he had much pleasure in moving a vote of thanks to the authors.

Mr. J. LOWE (Weymouth) seconded the motion, which was cordially agreed to.

The President was then heartily thanked for the arrangements he had made for the meeting, and for the hospitable reception he had given the members. The kindness of the Wesleyan Trustees in granting the Association the use of their school-room for the meeting was also acknowledged.

This concluded the business part of the day's proceedings.

PRESENTATION TO MR. HUMPHRYS.

The members dined in the evening at the Digby Hotel; the after proceedings being marked by an interesting event.

On reaching the toast of "The Honorary Secretary and Treasurer,"

The PRESIDENT said he was proud to have this toast in his own hands. During the years that Mr. Norton H. Humphrys had wielded the pen for them, he had done his level best to keep the Association on a proper platform, abreast of the times, and equal to any other similar Association in the kingdom. Mr. Humphrys had always shown a keen interest in all technical matters connected with the industry. They followed him in his writings, certain that he would not lead them astray; and if perchance he did make a mistake, he was the first to acknowledge it. He had been their Secretary for eleven years; having taken the post when he (Mr. White) vacated it. Mr. Humphrys had done noble duty for the members; and it was his pleasure to ask him to accept from the Association a silver tea and coffee service, which he hoped would grace his table for many a long year. The inscription on the tray ran thus: "This testimonial, including silver tea and coffee service, was presented to Mr. Norton H. Humphrys by the members of the South-West of England District Association of Gas Managers as a mark of personal esteem, and their appreciation of the admirable manner in which he had discharged the duties of Honorary Secretary and Treasurer for eleven years—April 28, 1896." Continuing, the President said: In handing this service to you, Mr. Humphrys, as a recognition of your services, we only render you a small token of the regard that it is meant to convey. I am sure that every member of this Association has appreciated your services in the past, and that the technical libraries of this country are the richer by the technical emanations from your pen. The Committee were unanimous in giving you this present; and I hope that you will accept it in the same spirit in which they hand it to you.

The toast having been enthusiastically honoured,

Mr. HUMPHRYS said that, in common with others who had found themselves placed in the enviable position in which he now was, he was experiencing some confusion in finding words with which to adequately express his feelings. As he had sat there that evening, surrounded by so many friends, his thoughts had gone back to the time when he first came into the south-west of England, and when he did not know a single person in the district. Contrasting that time with the present, when he had received so many marks of friendship, and the handsome present by which that friendship was ratified, he had reason to be grateful and thankful that he had risen to such an honourable position. When he came into the district 25 years ago, he was told by many friends that he was not doing himself much good; that it was a mistake to take the management of a country gas-works; and that he would get into a kind of rut, and would never be any better than he was then. But when he arrived in the district, he found the greatest kindness and cordiality awaiting him. He had not been there a week before Mr. Sainsbury called upon him; and the friendship which was then established between them had continued to this time, and would, he hoped, continue for many years more. There were also other old friends who had finished their careers, and had passed away to their well-earned rest. It had been a pleasure to him to draw the gas managers of the South-West together; and he believed that their meetings had been productive of good, and had been especially beneficial to themselves. The Association had been the means of placing many valuable communications before the gas world. For instance, there was the paper that had been read by Mr. Stagg that day, which must have involved a tremendous amount of work, and which dealt with a subject that was useful not only to the members, but to every manager of a gas-works. There was also the paper they had, a few years ago, from Mr. Richardson on the Severn Tunnel; and many other useful ones, which he did not care to particularize. When, however, he recalled them to mind, he felt that the Association had done some good service, of which it might well be proud. This was the last time he would have the pleasure of addressing them as members of the South-West Association. He had no reason, however, to suppose it was the last occasion on which they would meet together; and he quite believed that, in the future, they would have larger opportunities of improving themselves. He again expressed his thanks for the kind way in which the members had received him, and for the handsome recognition they had been pleased to make of his services. The gift would be greatly valued not only by himself, but by his wife and family.

Two or three other toasts concluded an enjoyable evening, and finished the active existence of the South-West Association as a separate organization.

OHIO (U.S.A.) GASLIGHT ASSOCIATION.

The Annual Meeting at Cincinnati.

(*Concluded from p.* 919.)

At this stage, a dip was made into the question-box. On the subject of which was cheaper for enriching—63 per cent. naphtha at 2½d. per gallon, or Bear Creek cannel at 18s. 4d. per ton—there was a preference for the cannel, if gas under 20-candle power was desired. Mr. Holmes had made a practical test with oil at 1¾d. per gallon and cannel at 10s. 5d. per ton; and he found that he saved nearly 1d. per 1000 cubic feet by using the cannel. As to the loss in illuminating power experienced by 20-candle gas between the works and a consumer's meter two miles off, with the thermometer at zero, 1 to 1¼ candles was considered a fair average.

Mr. H. L. Doherty, of Columbus, read a paper on "Selling Gas," commencing with a vigorous attack on the saying that "money is made or lost in the retort-house." He contended that money could be lost in any department with equal facility, and especially by want of attention to sales and the development of a demand for gas. It was necessary to see that there was an ample supply of good gas at all times, and that the customers were fairly and courteously treated. But further than this, they should be well posted up respecting the various purposes for which gas could be used, a reasonable amount of advertising should be resorted to, and so on. Shares in the company should be kept as far as possible among the consumers, and especially among the influential people of the district. After enlarging on the use of gas for heating, cooking, and motive power, the author passed on to notice the incandescent light and the prepayment meter. He had adopted the plan of maintaining the Welsbach burners in efficient order at a fixed charge according to the number used—commencing with 1s. per lamp per month for less than five, and gradually reducing to 5d. per lamp for a hundred or over. This included putting on clean chimneys once a week, and inspecting twice in addition; and he much preferred glass chimneys to mica. Some

device that would prevent the chimneys from falling in on the mantle when broken was badly needed, and would greatly reduce the cost of maintenance. The future of the Welsbach depended upon its sale being placed in the hands of the gas companies, who are interested in its permanent success, rather than being left to tradesmen, who cared for nothing beyond the actual sale of the appliance.

A long conversational discussion followed the reading of the paper. Mr. M'Donald thought the author had rather overstated the case, in respect to ventilation and gas-heating stoves. All the products of combustion could be removed from the apartment with a loss of less than 6 per cent. of the heat; and this was well spent in securing fresh air, which is necessary to health. But some ventilating stoves now on the market wasted 75 to 80 per cent. of the heat. This was due to the general ignorance on the subject, and the demand for cheap appliances. People did not know the difference between a good and a bad article, and would not pay even a shilling or two more to obtain greater efficiency. The use of gas in connection with a warm-water system had been proposed; but this certainly could not be cheaper than the direct-acting stove, and might prove much more costly. When the convenience of gas was fully appreciated, the public would use it, even if it proved to be three or four times as expensive as coal. Mr. Templeton thought that the system of maintaining incandescent lights, as mentioned by the author, would result in some loss. In particular cases, where there was much vibration, there would be a good deal of trouble. He had given some attention to heating by gas; and had come to the conclusion that gas at 4s. per 1000 cubic feet was quite out of the running as compared with coal. His idea with regard to heating by gas was to use it as an auxiliary, by having a coal-heater in the basement of the house, and gas-fires to be used in addition if required.

Mr. Doherty, in the course of his reply, said that he found the anti-vibrators a successful remedy for the difficulty mentioned by Mr. Templeton. He considered that the lamp maintenance scheme quite paid for itself. During the month of February, to keep 890 burners in order, he used 198 mantles, 308 chimneys, and 5 shades, which cost about £18; while the sum due for rents was £26. The balance of £8 was more than sufficient to cover the labour. He did not supply the apparatus in the first place free of cost, but expected the consumer to pay for it; and he preferred this plan, as people were more likely to be careful with goods that were their own property. In reply to Mr. M'Donald, he certainly thought that the effect of the products of combustion escaping into an ordinarily ventilated room was generally exaggerated. He agreed that direct-acting apparatus was the better, as water or air could not give out more heat than was put into it.

Mr. D. M'Donald, of Louisville, read a paper on the "Ventilation of Gas-Heated Rooms." After enlarging on the importance of pure air, he said that the ordinary open fire-place was an efficient, but costly, means of ventilation. The usual chimney would also act well with hot air or furnace heating. He described the various kinds of gas-stoves in use; and insisted on the use of a flue for carrying off the products of combustion, unless the apartment was abundantly ventilated in other ways. Some of the stoves used with natural gases ventilated well; but they were simply adaptations of the open fire-place, and were equally extravagant. It was possible to make a stove that would convey away its products of combustion at a temperature of about 225° Fahr., that would yield 94 per cent. of the total heat in a useful form; but to secure this result only as much air as is necessary for combustion must pass through the stove and up the flue. He quoted the results of an experiment that went to prove that an ordinary gas-fire only gave off 15 per cent. of its heat as radiant heat. The fire was burning at the rate of 1 cubic foot per minute for 18 minutes; and during this time, 2107 cubic feet of air passed through it and up the chimney—being raised from 44° to 390°. This was the way in which the greater part of the heat was disposed of; and there was in this direction a great margin for reducing the cost of heating by gas. He went on to show that a room 16 feet square and 12 feet high, could be maintained at a temperature of 70°, allowing for the exit of 3000 cubic feet of air per hour, which would be sufficient to keep up a proper condition of ventilation, by the complete combustion of 9 cubic feet of gas (yielding 680 units per foot) per hour. This was only for maintenance. In trying to raise the temperature of such an apartment, a consumption of 40 feet of gas per hour was resorted to; and this produced an unwholesome atmosphere. It was evident from these experiments that gas heating-stoves should not be used, as they often were, with the chimney or ventilator stopped up. With a gas-stove not properly arranged, it was possible to have a good atmosphere at a high cost, or economy with a bad atmosphere. People talked about the "dry" heat of a gas-stove; but he showed that the so-called "dry" air was really much more loaded with water than pure country air. He considered that the uncomfortable effects usually ascribed to dryness were the result of scorching a small volume of air to get warmth, instead of warming a large volume, which was the preferable course. A moist air was unhealthy, and was not wanted either indoors or out; and it was better to heat 100 feet of air to 100°, than 10 feet to 1000°. In concluding, he insisted on the importance of preventing any portion of the products of combustion from escaping into the apartment.

After a very full discussion on Mr. M'Donald's paper, the meeting returned to the question-box, and the contents were discussed. It was decided that the next meeting should be held at Cleveland; and after passing the usual votes of thanks, &c., the meeting terminated.

THE COMMERCIAL PRODUCTION OF CALCIUM CARBIDE.

In a paper recently published in the "Journal of the American Chemical Society," Messrs. J. T. Morehead and G. de Chalmont furnish particulars respecting the working methods followed by the Willson Aluminium Company in the manufacture of calcium carbide in large quantities. This is now being done at a cost under $25 per ton, including wear and tear and interest on capital. As the authors describe it, the process of manufacturing the calcium carbide is extremely simple; requiring no special training in anything beyond the care of the dynamos. The work consists in grinding and mixing the coke and the lime; starting the machinery (at Spray, North Carolina, water power is employed); seeing that the arc is formed; and shovelling in the mixture of lime and coke. The volt and ammeter show when to lower or raise the carbon points, which is done by means of a screw in the dynamo room, away from the furnace. The height of the piece of carbide in the furnace can be measured on this screw. When a height of 33 inches has been attained, the current is switched off to another furnace, and the carbide in the first is left to cool off, when it is quite ready to make acetylene gas by being placed in contact with water. This is the whole of the manufacturing operation. The cost of the product is largely a question of the cost of power and the raw materials. Any amount of water power is being offered to the Willson Company, in the sluices ready for the water-wheels, at $5 per horse power per annum.

The furnace used at Spray is built of bricks, in the shape of a "bee-hive" coke oven, measuring at bottom inside 2½ ft. by 3 ft., with a vertical central dividing wall. The bottom is closed by an electrode, composed of an iron plate covered with 8 inches of carbon. This covering is made of pieces of carbon pencils, or a mixture of coke and coal tar. The iron plate is connected with one pole of the dynamos by a rope composed of sixteen copper cables of 0·75 inch diameter. Sixteen similar cables go to the top electrode, which is made of six carbon rods, each 4 inches square and 36 inches long. These really constitute one "pencil;" being held together at the upper end in an iron holder, which is connected with a 3 inch square copper bar. The height of this top electrode can be adjusted by a screw-wheel. Certain modifications of this arrangement are introduced into the carbide plant at the Niagara Falls Works, chiefly to enable the furnace to be worked continuously, which is done by converting the bottom electrode into a sort of car running upon wheels. There is no alteration in the process of manufacture; and to describe them would only complicate matters without bringing any corresponding advantage.

In starting a calcium carbide furnace, the doors are shut, and the top pencils of carbon lowered to the bottom. The current is turned on, the arc started, and the mixture of lime and coke is fed in to such a depth as to keep the arc covered to a height of about a foot around the pencils. The feeding is continued from time to time for several hours. If the voltage of the current falls, the carbon points are raised. If the arc is broken, the amperage becomes zero and the voltage high, in which case the pencils are lowered and the arc restarted. The resultant carbide is always found as one piece between the pencils and the bottom, in a conical form, which may rise to 2 feet or 2 ft. 6 in. high. It never, however, completely fills the furnace; and it is therefore always surrounded and covered with some of the mixture of lime and coke, which protects the walls of the furnace from the heat. The piece of carbide has a shell which is mainly composed of carbon. The carbide itself is crystalline.

For manufacturing and commercial purposes, the carbide is rated by its yield of acetylene gas per pound. Pure carbide yields more than 5·90 cubic feet of gas per pound. It has, however, been found more economical to make a carbide yielding only about 5 cubic feet per pound. This material, which is the average quality, often has a reddish colour, especially if it has been made with a high voltage current. Carbide of bad quality is often greyish, or blackish, or will show streaks of graphite. The less ash there is in the coke from which the carbide is made, the better. That used at Spray contains about 7 per cent. of ash. It must be ground very fine, so as to pass through a 50-mesh sieve. The lime need not be so finely ground; but the largest pieces should pass through a 10-mesh sieve. The lime should contain at least 95 per cent. of calcium oxide, and not more than 5 per cent. of impurities. The presence of magnesia is particularly obnoxious, because it does not unite either with lime or with carbon in the furnace. The lime and coke must be very well mixed. The surplus material in the furnace can be used over again, if more carbon is added every time, as the carbon burns out quicker than the lime. Unslacked lime is preferable to air-slacked lime, mainly on account of the presence of moisture in the latter.

Carbide has been made successfully at Spray both by the direct and the alternating current, which is cited to prove that

electrolysis has no part in the Willson manufacturing process. The mixture put into the furnace consisted in one experiment of 50·08 per cent. of lime, and 39·22 per cent. of coke, containing 92·17 per cent. of carbon. Theoretically, 0·563 lb. of carbon and 0·875 lb. of calcium oxide are necessary to the production of 1 lb. of carbide. The average quality carbide (of 5 cubic feet of gas per pound) contains, however, free calcium oxide. The average consumption of raw material over a series of ten experiments was found to be, per pound of carbide, 1·228 lbs. of calcium oxide, and 0·837 lb. of carbon. These figures are admitted to be rather high, owing to imperfect furnace construction and wastes in working. The production per horse power of energy used is best with carbide yielding about 5 cubic feet of gas per pound; the yield of carbide in pounds varying inversely with the quality. At the mean quality mentioned, it is about 9 lbs. of carbide per horse power in 24 hours, including slag.

Besides coke, the manufacturers have used several other carbonaceous materials in the production of carbide, including soft coal, anthracite, charcoal, pitch, tar, resin, and asphalt. All yielded carbide. Only the three first possess commercial significance; and none of them gave such good results as coke.

A Petroleum Combination.—We learn from the "Pall Mall Gazette" that a new petroleum venture of considerable importance, with an influential Board of Directors, is shortly to be brought under the notice of the public. It is rumoured that the Company, in addition to controlling several well-known oil-fields, will take advantage of an exceptional opportunity for establishing under one management a complete organization and extension of existing businesses in the three branches of the petroleum industry—the production of crude oil, transport and refining, and storage and distribution of the various products.

Projected Acetylene Gas Scheme for New York.—A Bill has passed the New York Senate, and is now before the Gas and Electricity Committee of the Assembly, authorizing the manufacture and supply of acetylene gas by the New York Carbide and Acetylene Company. They are to have the power to break up the streets of New York, Brooklyn, or any of the cities, towns, or villages in Queen's, Richmond, or Winchester County; subject, in the cases of New York and Brooklyn, to the consent of the Commissioners of Works being first obtained. Various objections have been raised to the measure; but not, as far as can be learnt, from any of the Gas Companies. The price proposed to be charged is $1·25 per 1000 cubic feet; and it is thought by some to be impossible to sell the gas profitably at this figure.

The Determination of Nitrites in Potable Waters.—Messrs. Gill and Richardson have tested a large number of waters for nitrites, both by Trommsdorff's iodo-zinc starch method and by Griess's α-naphthylamine test; and, according to the "Journal of the American Chemical Society," they find very marked discrepancies in the results obtained by the two methods when applied to peaty waters. For instance, in cases where the Griess test showed as much as 0·0010 part of nitrogen (as N_2O_3) per 100,000, the Trommsdorff method gave no blue coloration. This difficulty can be overcome, and concordant results obtained, if the water be decolorized by agitation with milk of alumina and then filtered. This is prepared by precipitating a boiling solution of 125 grammes of potash alum per litre, with ammonia, letting the alumina settle, and washing by decantation. Even with Griess's test, it is found advantageous to decolorize peaty waters before applying the test. The authors regard 0·0001 part of nitrogen (as N_2O_3) in 100,000 parts as the limit of the naphthylamine test; while the iodo-zinc starch method is incapable of indicating less than 0·0002 part of nitrogen per 100,000 parts.

The Sulphurous Products of Gas Combustion.—In the "Zeits. für Anal. Chem.," Herren Dennstedt and Ahrens have dealt with the subject of the relative proportions of sulphurous and sulphuric acids formed during and after the combustion of coal gas; and a short notice of their work appears in the current number of the "Journal of the Society of Chemical Industry." In a previous issue of the former publication, Herr Collan described a process for determining sulphur dioxide and sulphur trioxide in the combustion products of coal gas; and it was referred to in the "JOURNAL" for Oct. 8 last (p. 729). He came to the conclusion that the whole of the sulphur is converted during combustion into sulphur dioxide, and remains in this condition in the atmosphere. This conclusion the authors cannot confirm. According to their experiments, the proportion of sulphur trioxide produced in the flame itself is, indeed, comparatively small (7 to 8 per cent.), although it varies to some extent with the rate of air supply during combustion. However, this point is of no particular importance, since it is shown that the sulphur dioxide, after leaving the flame, suffers, in presence of atmospheric oxygen and moisture, continual further oxidation to sulphuric acid; and the authors believe that under favourable conditions, such as obtain when gas burns in the open air, this oxidation would be completed in a very short space of time. As regards Collan's analytical process (absorption in standard chromic acid and final titration of the unreduced portion), it appears that it yields erroneous results, owing to the presence of other reducing bodies besides sulphur dioxide.

REGISTER OF PATENTS.

Supplying Gas to Atmospheric Burners.—Duke, J. F., of Newington, Surrey. No. 9301; May 10, 1895.

This invention in atmospheric burners relates to means for providing such burners with a pilot-jet of non-atmospheric gas, and for supplying gas to such jet in addition to the supply of gas to the atmospheric burner. Hitherto when atmospheric burners have been provided with a pilot-jet, it has been usual to fit the gas-supply apparatus with two taps—one for the pilot-jet, and the other for the burner proper. But in this burner, the tap has—in addition to the ordinary gas-way in the plug, for the flow of gas to the burner proper—a small passage-way in the plug, and another small passage-way in the shell of the tap. The last-named passage-way is in communication with the pilot-jet; the parts being so arranged that, when the plug is turned a short distance, the gas flows through the small passage-ways to the jet, but not to the burner proper. When, however, the plug is turned a further distance, the gas flows to the burner proper; and, when the tap is fully turned, there is no flow of gas either to the pilot-jet or to the burner proper.

Incandescent Gas Mantles.—Reeser, H., of Amsterdam. No. 10,129; May 22, 1895.

This illuminant body or mantle consists essentially of "a solution of aethogen, mixed with a solution of the nitrates or other salts of thallium, titanium, samarium, neodymium, and magnesium," in about the following proportions:—

3 to 4	parts by weight	of	boron nitride (aethogen)
25 „ 30	„	„	thallium nitrate
2 „ 3	„	„	titanium nitrate
2 „ 3	„	„	samarium nitrate
2 „ 3	„	„	neodymium nitrate
3 „ 4	„	„	magnesium nitrate

The patentee says: I take the nitrates or other salts of the thallium, titanium, samarium, neodymium, and magnesium (which salts may, if desired, be produced by dissolving the oxides in nitric acid or other suitable acid), and I dissolve the salts in water so as to form a concentrated solution thereof. The oxide of titanium is known as sagenite. I dissolve the boron nitride in heated nitric acid; and, after filtration, I add the filtrate to the solution above mentioned. In making mantles, I take the usual cotton or other suitable fabric, and impregnate it with the solution of aethogen and other metallic salts. The impregnated fabric is dried; and the organic matter thereof is then burned away in a bunsen or other suitable flame, so as to convert the salts into oxides.

Manufacture of Gas.—Ladd, J. H., of Queen Victoria Street, E.C. No. 10,477; May 27, 1895.

This invention is for an improvement on the "Cold Process" gas-making arrangement, for which certain advantages were claimed some years ago by the "patentee," Mr. J. H. W. Stringfellow—No. 6575 of 1890.

It may be remembered that the process of making gas described in the former patent consisted in causing atmospheric air at the normal temperature, or without the application of heat, to come into intimate contact with liquid hydrocarbon, so as to become more or less charged with hydrocarbon vapour, and then causing the gaseous fluid thus formed to come into intimate contact with water at the normal temperature, so that it became charged with vapour of water. It was claimed that a gas was thereby produced which had a great heating power, and which was useful for a great variety of purposes. The apparatus described in the former specification comprised a set of screens or frames covered with absorbent material, upon which liquid hydrocarbon was permitted to fall from a tank above, and through which air was forced. The apparatus also comprised a water chamber, in which were placed similar screens or frames covered with absorbent material, dipping at their lower end into the water so as to raise it by capillary attraction. Through this absorbent material the air charged with hydrocarbon vapour was caused to pass, so that it would take up the vapour of water.

Now the present patentee says he has "found in practice that, without the application of heat, the process cannot be effectively carried on in cold weather, and that only the very light or volatile hydrocarbons can be used with effect in such process, by reason of the slow evaporation of the heavier grades of liquid hydrocarbons at the ordinary atmospheric temperatures, and also of the lighter grades thereof at low temperatures." Therefore he proposes to provide for imparting the requisite degree of heat to the air, hydrocarbon, and water used in producing the gas. He applies to the liquid hydrocarbon—preferably before introducing it into the tank from which it flows on to the screens of absorbent material—sufficient heat, having regard to the specific gravity of the hydrocarbon employed, and to the atmospheric temperature, to ensure the requisite rate of evaporation of the hydrocarbon, and consequently the proper charging of the air with the hydrocarbon vapour. He also applies sufficient heat to the air—preferably in the air-receiver—to obviate any liability to condensation of the hydrocarbon vapour by the contact therewith of air at a much lower temperature. If desired, he also applies heat to the water from which the screens of absorbent materials in the water chamber draw their supplies. It is, he says, desirable to have the air, the hydrocarbon, and the water all at about the same temperature.

Constructing Beds for Gas-Retorts.—Joyce, M. J., of Basinghall Avenue, E.C. No. 10,735; May 30, 1895.

This "invention" consists in the combination with gas or other retorts of a tunnel or alley with openings from the sides thereof to the ash-pits and furnaces, and arranged so that the furnace-bars can be clinkered, and the furnaces and ash-pits cleared, without the operators being exposed to danger from coke, tar, or the like, falling from the retorts.

Washing and Scrubbing Gas.—Hersey, S., and Kirkham, Hulett, and Chandler, Limited, of Palace Chambers, Westminster. No. 12,020; June 20, 1895.

This improvement in "apparatus for washing and scrubbing gas" is to prevent the escape of unwashed gas through the spaces between the division-plates and collar casting facings in gas-washers of the "Standard" washer-scrubber type. For this purpose, round the centre opening of each division-plate, is bolted a ring provided with an annular recess, adapted to receive a spring, or a number of springs, and a loose metal ring, which ring (under the action of the spring or springs) bears against the faced collar casting, and closes the space between the collar casting and the division-plate.

Gas Heating-Apparatus.—Denayrouze, L., of Neuilly, France. No. 12,092; June 21, 1895.

This invention refers to the combination with gas heating or cooking apparatus of a fan, and means of driving it, so as "to mix thoroughly the gas and a suitable proportion of air to supply the burners."

The patentee remarks: When a mixture of gas and air is burned, the heating effect is greater when there is a thorough mixture of a large portion of the air with the gas. My invention relates to the construction of gas heating and cooking apparatus, so arranged that thorough mixture of gas and air is effected before the mixed gases reach the jets or flame orifices, where they meet the additional air necessary for combustion. For this purpose, I employ a fan or revolving agitator through which the gas, with an adjusted supply of air, is made to pass—both becoming thoroughly mixed on their way to the burners. This fan or agitator may be driven in any convenient way, as, for instance, by an electric motor, or by clockwork which is from time to time wound up by hand, or by the action of an electro-magnet; or, in cases where there is a chimney or flue, there may be arranged a jack which is caused to revolve by the ascending products of combustion, and is connected to the revolving mixer by bands or other gear.

Incandescent Mantles.—Crocker, S. H., of Furnival Street, E.C. No. 19,202; Oct. 12, 1895.

This invention relates to a composition of refractory substances for use in producing incandescent light when made up into hoods, mantles, or equivalent forms suitable for the purpose.

The composition consists of oxide of thorium, in combination with a very small proportion of the oxides of one or more of the following metals: Ytterbium, scandium, thulium. It is well known, says the patentee, that a hood or mantle made of thorium alone gives off but little light, and forms also a rigid mantle. It has been found that, by adding a small proportion of the oxides of the rare metals above stated, an improved light is obtained, and the mantle is moreover flexible—allowing a better shape to be given.

The mantle is made in the manner described in patent No. 15,246 of 1895—viz., a sheet of cellulose material is saturated in the solution, and afterwards perforated, and a mantle made therefrom. Afterwards the organic matter is removed by burning in the usual way. A suitable admixture of the components referred to may be effected by mixing the oxides directly; the rare oxide or oxides forming about 1 to 2 per cent., or thereabouts, and the oxide of thorium the remainder. The patentee prefers, however, to mix together nitrates, acetates, or sulphates (or any other salts of the metals which will give oxides when heated to a high temperature), and then convert the mixture into oxides by heating.

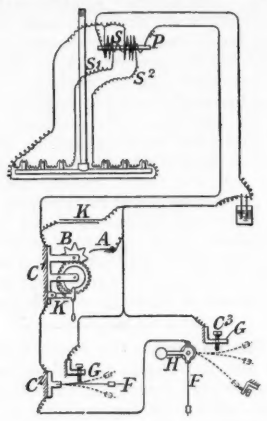
Electrically Lighting Gas-Jets from a Distance.—Morstein, O. von, of Schöneberg, near Berlin. No. 20,801; Nov. 4, 1895.

In explanation of his invention, the patentee says: "Illuminating gas, when left unused for a length of time, decomposes in the pipes; and some time passes before the products of the decomposition which are uninflammable, and the column of air which may be present between the gas-cock and the burners, are forced out by the succeeding inflammable gas. Therefore, in the devices hitherto employed for electrically lighting gas-jets from a distance, there exists the danger that, after the opening of the gas-cock—whether by hand or by means of an electro-magnetic cock-opener, with a too brief contact-making—the ignition of the gas is not effected, and consequently the non-observance of this circumstance (especially when the flames are not visible from the position of the contact-maker) may lead to gas explosions and poisoning by gas. Another serious disadvantage—which, it is true, only presents itself with such devices as effect the ignition of the gas by means of induction currents—is that hitherto the interruptions of the current necessary for the inducing action have been effected at the inductor and by electro-magnetic means. There is then, by this electro-magnetic current-breaking device, either occasioned in the primary circuit a resistance extremely injurious to the induction action, or the magnetic attractive force at disposal remains so small that a perfectly secure action of the current or circuit-breaking device is not thereby attainable, or is deranged by the slightest causes."

This invention (for the suppression of these two evils) consists mainly in that one or more secondary bobbins S, S^1, S^2—located at any distance from the gas to be ignited, and having their wire ends terminating in igniting points—are placed over primary bobbins P, while the contact-place C, C^1, C^2, C^3 (that is to say, the places from which the gas is to be ignited) is so arranged that the same manipulation, which may be a single pressure or displacement of a lever, simultaneously and automatically both produces a contact lasting for a sufficient length of time to obtain a secure ignition of the gas, and also causes this contact to be an intermittent one.

A contact which lasts for a certain time and gives interruptions of current may be provided in different ways. In the drawing, contact C^1 shows a clockwork, which, by means of a pull, a pressure, or the like (disengagement of the pawl K from the stop-wheel), is released for one revolution of the wheel, and operates the current-breaking contact with the contact-piece A by the teeth of one of its wheels B. Each winding or placing in tension of the clockwork may be easily combined with the actuation of the releasing device—for instance, the crank or lever by which the clockwork is wound up may be arranged to disengage the pawl in the latter part of the revolution.

A simple arrangement (contact C^2) consists of a vibrating spring F, which, set in oscillation by hand, strikes against a contact-piece G. With a corresponding length and thickness of the spring, and dimensions of a weight applied to its end, a suitable number of oscillations



in a given length of time, or a certain duration and velocity of the oscillations, may be obtained. A similar contact-device may also be designed in such manner that, simultaneously with its action, the gas-pipe closure may be opened. For instance, the hand-lever by which the clockwork C^1 is released or the spring F in C^2 set in oscillation, may be connected direct to the plug of the cock. Should there be in the device an electro-magnetic gas-closure opener to be actuated, the necessary close circuit therefor may be given through the same manipulation.

The construction of the contact-device may, as regards details, be carried out in widely different ways. For instance, as shown in contact C^3, the spring F may be brought into the position corresponding to the contact-piece G, by moving the gas-cock lever H or the like, and thereupon set in oscillation by brushing past a bracket or part B. A condenser K is interposed in a known manner between the current-breaking place.

Glow-Bodies for Incandescent Gas Lighting.—Kortwich, C., of Berlin. No. 2000; Jan. 28, 1896.

The patentee claims to have found that the great liability to fracture of the glow-bodies hitherto employed for different systems consists in their fully amorphous condition, while the sensitiveness of the same to atmospheric dust is due to the circumstance that the oxides used in the glow-bodies enter into comparatively readily melting combination with the elements contained in the dust whereby the illuminating capacity of the glow-bodies is diminished.

The object of the present invention is to suppress these disadvantages by the employment of a combination of substances possessing, on the one hand, a crystalline structure—that is to say, a structure in which the crystals passing through the body of the material possess the property of increasing the inner cohesion of the glow-body—and, on the other hand, the property of not readily entering into combination with the bodies contained in the dust.

The advantageous properties mentioned are said to be possessed in a high degree by a number of substances, such as boron, arsenic, and antimony in the form of borates, arseniates, and antimoniates of the alkaline earths, earths, and precious earths, "by which latter is meant those elements which in watery solution possess unstable sulphides, and whose hydrates are insoluble in ammoniacal solution." While the borates rich in boric acid readily melt in glowing heat, such is not the case with borates poor in boric acid.

The arsenical acid combinations of the alkaline earths, earths, and precious earths are thoroughly constant, and are characterized by a high illuminating capacity. As now the atmospheric dust contains in bases, in conjunction with the volatile alkalies in the heat, mostly alkaline earths; and these, in combination with arsenical acid, enter with difficulty into melting combinations. The glow-bodies made from the arseniates of the substances are not in any way affected by an external influence of this kind. The antimoniates of the substances are characterized in a very high degree by firmness, illuminating capacity, and resistance to external influences.

In the production of glow-bodies according to this invention, the patentee proposes to employ the process described by Williams in his patent No. 225 of 1882 and by others—of the saturation of combustible absorbent bodies with salt solutions or emulsions, with subsequent burning away of the combustible foundation body. The following is an example of glow-body compounds in the form of a solution serving for the impregnation:—

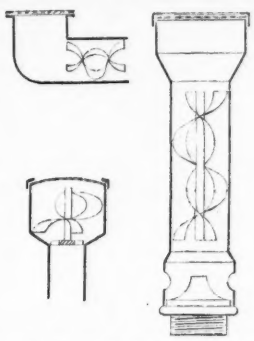
Thorium nitrate	22·25 parts.
Lanthanum nitrate	2·75 ,,
Cerium nitrate	1·50 ,,
Yttrium nitrate	0·35 ,,
Chloride of antimony	0·75 ,,
Zirkon nitrate	2·00 ,,
Pyrotartaric acid	2·00 ,,
Water	70·00 ,,

Instead of chloride of antimony, another salt of antimony soluble in water may be employed, or boric acid or chloride of arsenic or other arsenical salt soluble in water.

Gas-Burner Tubes.—Ernst, E., of Berlin. No. 2910; Feb. 8, 1896.

This invention in incandescent and other gas heating-burners is intended to provide for the conveyance of the mixture of gas and air

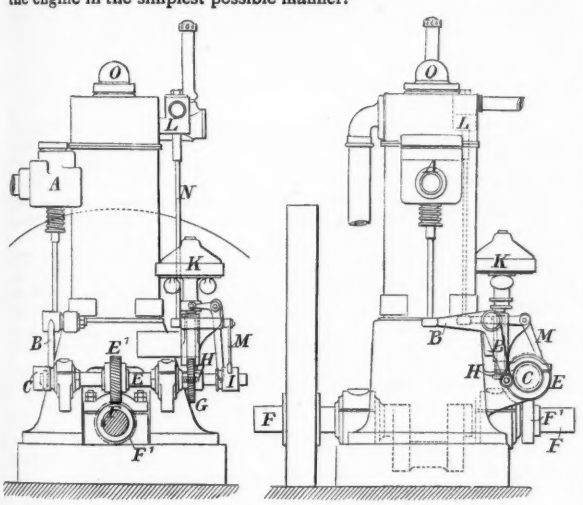
throughout the whole or a portion of its travel from the gas outlet-nozzle to the place of combustion, along "two or more spirals connected together, and having reverse convolutions, in order to divide the mixture into opposite layers, for more thoroughly mixing the gas and air."



Three different ways of carrying the invention into practice are shown. Of the two spirals of thin sheet metal or the like in the mixing-tube of an ordinary bunsen burner, one has right-handed convolutions wide enough to come into contact with the inner walls of the tube; while the second spiral is coiled upon a pin in a reverse direction, and hence has left-handed convolutions. These spirals may be placed in the burner proper, which is enlarged for this purpose; and, as shown, they may, when necessary, be in a horizontal mixing-tube, instead of a vertical one.

Gas Motor Engines.—Abel, C. D.; a communication from the Gasmotoren Fabrik Deutz, of Koeln-Deutz, Germany. No. 3217; Feb. 12, 1896.

This invention relates to upright gas motor engines having a crank-shaft at the bottom; and it consists in "an improved arrangement of gear for imparting the requisite motion to the valves of such engines, for the purpose of insuring the noiseless working thereof, and at the same time to impart the motion to the valve-gear on opposite sides of the engine in the simplest possible manner."



The illustration shows a front and side elevation of the engine.

The way-shaft E, which actuates the valve-gear of the engine, is arranged at right angles to the crank-shaft F, and receives motion therefrom by skew or worm gear F1 E1, so as to revolve at half the speed of the crank-shaft. The way-shaft actuates the discharge-valve A by means of the cam C and elbow-lever B. It also actuates the gas admission-valve L, by means of the cam I, lever M, and rod N; the position of the cam I on the shaft E being controlled by the governor K, driven from the shaft E either by skew or worm gear G H, as shown, or by pulleys and a cord or belt. Any other known valve arrangement for regulating the gas supply can be employed, actuated by the sliding cam I controlled by the governor. The air inlet-valve, which is covered by the protecting cap O, can either be arranged to act automatically, or it may be actuated by another cam on the shaft E.

APPLICATIONS FOR LETTERS PATENT.

7773.—Godfrey, R., and Norrington, J. P., "Facilitating the lighting of lamps in public streets or elsewhere when using the incandescent or other mode of illumination." April 13.

7869.—Kent, H. A., "Generating, accumulating, and regulating a constant supply of acetylene gas." April 14.

7901.—Mitchell, J. M., "Mixing air and gas." April 14.

7913.—Johnson, E., and Thompson, J., "Gas regenerative furnaces." April 15.

7923.—Durnan, T., "Supplying acetylene gas to railway carriages and other vehicles." April 15.

7933.—Greenwood, E. P., "Gas cooking, heating, and ironing appliances, including thermometer and supply taps for same." April 15.

7955.—Howard, C., "Air-cone for incandescent gas-burner and the like." April 15.

8005.—Irwin, W., "Extraction of cyanides from coal gas." April 16.

8061.—Gibbons, W. P., and Gibbons, G. B. A., "Dies used in making taper gas-retorts." April 16.

8089.—Seck, W., "Outlet-valve motion for gas and oil engines." April 17.

8103.—Rhodes, O. Y., "Preventing or reducing the noise and heat from the exhaust of gas or other engines." April 17.

8131.—Catherwood, A. H., "Incandescent gas and similar lamps." April 17.

8149.—Ernst, E., "Gas heating-burner for incandescent lighting." April 17.

8169.—Meyer, P., "Electric lighter for incandescent gas-lamps." April 18.

8185.—Ebbutt, P. G., "Raising or lowering electric light fittings, gas-fittings, and the like." April 18.

8234.—Burchard, L. S., "Prepayment meters for gas or other fluid, or for electricity." A communication from W. Webber. April 18.

8239.—Gautzsch, C., "Producing illuminating gas." April 18.

8240.—Crocker, S. H., "Incandescent gas-stoves." April 18.

8241.—Prestwich, W. H., "Globes, shades, and chimneys for incandescent gas or oil lights." April 20.

8245.—Potter, W. G., "A governor meter." April 20.

8247.—Solon, M. F., and Bibbero, Marquis, "Bunsen retor superheating gas-burner." April 20.

8255.—Dale, J. O., "Mechanical motors driven by steam, compressed air, mixtures of gas and air, petroleum and air, or other explosive mixture." April 20.

8304.—Bourquin, C., Besson, J., and Pute-Cotte de Renéville, P. H., "Manufacture of briquette fuel." April 20.

8346.—Brown, A. O., "Gas-lamps." April 21.

8357.—Dunsmore, M. C., "Explosive gas and oil engines." April 21.

8384.—Thwaite, B. H., "Process and plant for generating combustible gases." April 21.

8444.—Jaques, W. E., "Grilling and boiling apparatus for gas-stoves." April 22.

8484.—Wilson, J. W., "Appliances for bending and shaping lead pipes." April 22.

8502.—Livesey, F., and Sugg, W. T., "Gasholders." April 22.

8507.—Hinks, J., & Son, Limited, and Baker, F. R., "Chandeliers gaseliers, electroliers, and other hanging lamps." April 22.

8509.—Schodt, P. G. de, "System and means of illuminating and heating applicable with gas and mineral oils." April 22.

8512.—Dolman, G. W., "Water or electric conduits and the like." April 22.

8532.—Holman, S., "Apparatus for use in creating currents of air, or gases, more especially intended for effecting the ventilation of sewers." April 23.

8555.—M'Ghee, G., "Gas or internal combustion motor engines." April 23.

8611.—Wright, W., and Reed, F. J. P., "Pilot light for lighting clusters of incandescent burners." April 24.

8612.—Simons, C. E. G., "Apparatus worked by hydraulic, hydrostatic, or pneumatic power, for operating levers or cocks of any description, more particularly those used in gas lighting." April 24.

8613.—Brightman, J., "Automatic prepayment apparatus for gas-meters." April 24.

8639.—Lewis, R. A., "Gas-regenerative furnaces." April 24.

8644.—Tourtel, J., "Coin-freed mechanism for prepayment gas-meters." April 24.

8703.—Martin, E., "Union nuts or like connections for pipes." April 24.

8704.—Perken, F. L., & E. T., and Rayment, A., "Apparatus for producing acetylene gas or the like." April 24.

8755.—Myers, T., "Apparatus for silencing the exhaust from gas and vapour engines." April 25.

8776.—Hampton, E. W., and Wright, J. R., "Incandescent gas-burners." April 25.

Water Gas for Birkenhead.—It is reported that a scheme will shortly be submitted to the Birkenhead Town Council for the introduction of water gas. It is proposed to put up plant capable of a daily make of 2¼ million cubic feet; the cost being estimated at about £13,000. The adoption of carburetted water gas will, it is said, obviate the expenditure of nearly £25,000 on additional coal gas plant.

Manchester Gas Affairs.—The Gas Committee of the Manchester City Council will, at the meeting of that body to-morrow, ask for permission to apply for power to borrow the sum of £250,000 for the purposes of the gas-works. Considerable extensions of the works have been carried out within the past four years, particularly at the Bradford Road station; and at the present time, a huge new gasholder is being erected, while the manufacturing capacity is being enlarged by the provision of carburetted water-gas plant. The Local Government Board have given their consent to the borrowing by the Corporation of £25,000 for the erection of sulphate of ammonia plant, &c. The application for this sum was, it may be remembered, the subject of an inquiry, by Colonel W. M. Ducat, in January and February last.

Sales of Shares.—At the Mart yesterday week, Mr. Alfred Richards sold by auction 500 £10 "C" 7 per cent. shares in the Harrow and Stanmore Gas Company, the last dividend on which class was at the rate of 5¾ per cent. per annum. The result of the sale was that 430 shares sold at £13 each, returning on the investment £4 0s. 9d. per cent., and 70 shares realized £13 2s. 6d., returning on the investment 4 per cent. As announced in our advertisement columns, Mr. Richards will offer for sale at the Mart next Monday a quantity of stock and shares in a number of well-known London, Suburban, and Provincial Companies; the first lots which will be submitted consisting of a new issue of 6 per cent. "D" preference shares in the Aldershot Gas and Water Company. Some £25 shares in the Hastings and St. Leonards Gas Company have recently changed hands at £71 and £72 each. Thirty £5 shares (£4 5s. paid) in the Garforth Gas Company, Limited, realized £6 1s. each at a sale in Leeds yesterday week. At Bishop Auckland last Friday, Mr. D. Armstrong conducted a sale of 500 £10 shares in the Bishop Auckland Gas Company. The prices obtained ranged from £16 12s. 6d. to £17 per share; the average being £16 17s. 3d., which, on a basis of 7 per cent. dividend, will realize 4 per cent. The total proceeds of the sale amounted to £8431.

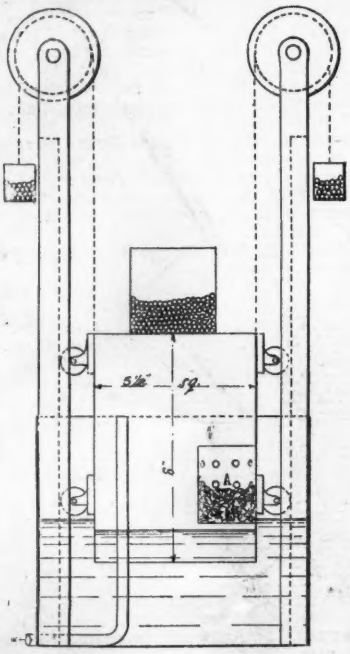
CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

An Acetylene Gas Explosion.

SIR,—May I take the liberty of asking, through your valuable paper, Professor Vivian B. Lewes or some other gentleman interested in the study of acetylene to explain to me what I am going to relate?

I have constructed a self-working apparatus for the generation of acetylene from calcium carbide. To spare a description I append a sketch. The parts are made of tinned iron except the guides, which are wood. By placing a few pieces of calcium carbide in the perforated pot A, and by letting the float dip in the water, I had an evolution of C_2H_2, which burned well at the burner—a small Bray's. I repeated the experiment the second time with more pieces of C_aC_2, causing more pressure on the holder (by putting about 1½ lbs. of shot in the vessel on



the top of the float) with the same success, but a slightly smoky flame. I decided to make a final experiment by filling the pot A with over ¼ lb. of C_aC_2, and removing about 1 lb. of shot. The holder was raised as in the former experiments; but, while I was going to open the tap of the burner to let off the explosive mixture before I could produce a light, an explosion took place, blowing up the holder (not bursting it, of course) and igniting the escaping gas. Pieces of carbide, and much water were scattered on the table; and I noticed they would evolve acetylene, which took fire if I let them in the splashes of water.

As far as I know, there was no cause for an explosion. There were no other lights in the room, and the apparatus was near an open window; while the burner was fixed about 10 feet away. There is no probability of it being caused by friction with parts made of copper; for, as I have stated before, the holder, &c., were all iron, and the tube was partly of lead and partly of rubber. I cannot account for it; and I shall be obliged if I could get some explanations or suggestions to remedy the trouble.

P. INFANTE.

April 21, 1896.

P.S.—I should say that during the three experiments I never changed the water of the tank.

The Recent Accident to a Gasholder at Gothenburg.

SIR,—When I sent my letter of queries to the "JOURNAL" on the above holder, I thought it was necessary that the answers should come from an eye-witness, or at least from one having a special knowledge about it. Mr. Cripps, in reply, testifies to what he has not seen, and states his judgment thus: That the causes of failure in the Gothenburg holder were (1) The shallowness of the lifts; (2) the enormous play in the rollers; and (3) having rollers on the top of each lift only, instead of on the top and bottom."

In answer, to be critical, I would point out that Mr. Cripps describes as causes what are only conditions. Besides his enumeration is logically incomplete. Has he studied Boole's Logic? To suggest what my position is, I quote from his "Guide-Framing of Gasholders:" "The guide-framing must be perfectly stable, and at all times preserve the level working of the holder." To this I add that, while it may maintain, it does not determine, the level working of the holder.

I am too far away to enter into a controversial correspondence. But the last few months enabled me to have a variety of experiments on gasholder working; and the inferences I have drawn are: (1) That in hot countries, the cups of holders should not be less than 9 inches wide and 21 inches deep; and (2) that there should be a combination of the radial and tangential rollers, with the addition that the radial roller should be within flanges equally with the tangential.

In reading Mr. Cripps's letter, I almost wished that I had been in the old country, and thus have enabled me to cut him up with logical mood and figure, for his ungraciousness in preventing me from knowing more about the destroyed holder.

Since Mr. Cripps is so anxious for attack, why cannot he publish a book on gasholders—their construction and working, with full particulars of specifications and complete working drawings, embracing all about their tanks and total cost? The principal gasholder makers will obey his call, as it could be looked upon as an advertisement; and the gas engineers concerned would not be backward to give of their stores, and supposing that he goes into copartnery with a well-known professor of Applied Mechanics, and the result be a philosophic, mathematical, and practical introduction to the said book, why such a book would lie alongside "King's Treatise on Gas Manufacture," Walmisley on "Iron Roofs," and Humber on "Iron Bridges."

D. COATES NIVEN.

Calcutta, April 15 1896.

SIR,—With reference to the final paragraph in Mr. Samzelius's letter in the present issue of the "JOURNAL," let me assure Mr. Samzelius that I have no wish to see the drawings and details of his holder on my own account. I am perfectly satisfied, from the few details already published, that it is most defective in design.

All I have written on the subject, as you know, has been for the purpose of helping Mr. Samzelius to rectify mistakes, and thereby protecting life and property in Gothenburg. I do not moderate my opinion in the slightest, as he insinuates in a preceding paragraph, but still consider that the few details of the holder already published are sufficient to condemn it unless it is properly reconstructed.

I will now only add the following points, which all the beating about the bush and quibbling over trifles cannot possibly controvert:—

1.—It is admitted that the cup *did* "blow;" otherwise the gas could not have escaped from the cup, and caught fire.

2.—Hence, the water in the cup, *at the point where the gas blew out*, must have been *less in depth than the actual pressure of the gas* inside the holder at the time of "blowing."

3.—If the gasholder was freely floating, and *not jammed* at the time of "blowing," then it *must* have been tilted to the fullest extent necessary to admit of the gas blowing out at its ordinary pressure of 5½ inches, whether the "tilt" required be 19 or 900 inches.

4.—If the water-level was greater than 5½ inches at the point of blowing (this being the maximum pressure due simply to the weight of the holder), then the gasholder *must* have jammed in the guides.

A careful consideration of these four points will, I think, convince anyone that the failure must come under either conditions (3) or (4). Whichever it may be, it was caused by tilting; and *tilting* cannot take place unless the elasticity of the structure, or the play between the rollers and the guides, will admit of it, or by some obstruction to the free ascent of the holder on one side, such as a block in the roller path. But nothing can possibly cause so much tilting as the absence of the bottom and cup rollers. Hence, knowing the causes of tilting, it is only necessary in the reconstruction to provide against them, by the proper *stiffening* and *guiding* of the holder.

In passing, I may say that I am of opinion that a ⅜-inch boiler-plate Piggott's cup, 12 inches wide, is very likely indeed to spring under certain conditions. For any gasholder to get even 7½ inches out of level is monstrous, and would never be permitted in any first-class gas-works in this country. And yet Mr. Samzelius states that he has observed the Gothenburg gasholder "blowing at a little more tilt than 16 inches!"

Mr. Samzelius may rest assured that no experienced gas engineers in England will pretend to adopt the construction favoured in Gothenburg. Very many years ago, gasholders were constructed in England somewhat similar to the Gothenburg pattern—*i.e.*, having rollers *above* the water, fixed at the foot of the column guides, and also on the top of the grip, working against outside guides on the outer and inner lifts respectively. But this was in the days of baby gasholders; and it has long since been discontinued in the best practice.

F. S. CRIPPS.

27, *Great George Street, S.W., April* 29, 1896.

P.S.—The printers' error in substituting the word "aware" for "unaware" in Mr. Samzelius's letter, does not make the slightest difference to any of the remarks in my former letter.—F.S.C.

The Sale of Gas Stock to Consumers.

SIR,—If any of your readers are favourably inclined towards this most satisfactory method of placing gas stock, I have noticed, in glancing through my evidence reported in this week's "JOURNAL," an error that may mislead them.

In the middle of the first column on p. 926, it is stated that the last issue of £100,000 Gaslight "A" stock was offered for sale by tender at the reserve price of £292, which was well under the market price. I then said: "Tenders were opened on Dec. 19; and *on that day* the stock was sold *on the market* at £299½." The words italicized are omitted. The £299½ is the figure given in the "JOURNAL" of an actual sale in the market on the day in question, and not the price realized for the new stock. Only £49,000 was tendered for—presumably at very little over the reserve of £292; and the remainder was taken by the shareholders at that figure. Had the whole been offered to consumers, it would certainly, judging from our experience, have been taken at the full market value, and the Company would have secured a number of friends and supporters.

It is to be regretted in the public interest—the Company can take care of itself—that the Committee did not take a broader view of this question. They might have created a valuable precedent, good both for gas companies and the public, especially the small investor. But they lost the opportunity. The average amount of stock taken by our 2700 (odd) consuming shareholders is only about £60—ranging from £5 to about £300.

The perfectly gratuitous alteration of the qualification of workmen directors, to the practically prohibitive figure of some £340 in cash, does not distress me. It is only another and unexpected difficulty that certainly will be overcome. Fortunately there is a House of Lords!

Happily the question of the conversion of gas stocks is at last satisfactorily and finally settled.

GEORGE LIVESEY.

May 1, 1896.

The Flash Point of Burning Oils.

SIR,—I am obliged by your notice of my paper on the "Standard of Flash Point" read before the Scottish Section of the Society of Chemical Industry.

You say that it is alleged that naphtha is put in as an adulteration, although stated to be generally dearer than burning oil. It is often dearer than burning oil in this country, but never in America. It is an advantage to the Americans in two ways to put naphtha into burning oil. They get the price of burning oil for the 7 per cent. of naphtha which they put into the burning oil to bring it down to our standard; and this makes naphtha scarcer, so that they get a much higher price for the naphtha that is left. This is brought out in a paper by Dr. Lobryde Bruyn, the Chemist to the Admiralty of the Netherlands, published recently in the "Chemiker Zeitung." The advantage to the Standard Oil Trust on the European consumption must be very considerable. So the American manufacturers are interested in keeping the European standards low; and all the more that they cannot sell low-flashing oil in America to cause accidents at their own doors. Petroleum merchants in the country are now almost all servants of the Standard Oil Trust, and all using their influence to keep things as they are, to suit their employers. Such a numerous and powerful party being against change, and an infallible Government Department having made a mistake, we must not be surprised that Government, Parliament, and even the Press seem all combined to keep the Sixth Commandment abrogated as far as petroleum is concerned. To my mind, this is worse than anything we read about in Turkey or Africa; and scientific men and journals must not be afraid to use language that looks sensational, for nothing else is appropriate.

What is required is to raise the standard to the *lowest* point that would ensure safely—say, 100° or 105° at most. Some talk of raising the standard to 150°. This looks like extra safety; but, in reality, it plays into the hands of the foreign producer, and would cause all the household oil of the poor to come in about 80° as at present. This, under surveillance, would no doubt result in a slight reduction of fatalities, but would cause burdensome interference with trade. Let us strike the just medium, and give practically safe oils (100° to 150° flash) the advantage by letting them escape irksome reugulations; and all the oil of the poor will immediately come in safe. Naphtha and burning oil will come in separately, and fatalities and fires will cease.

Broxburn, N.B., April 29, 1896. D. R. STEUART.

The Remuneration of Gas Collectors.

SIR,—It is somewhat refreshing (after reading the unfortunate experience of a gas collector at Stockport, *ante*, p. 878) to read Mr. Penney's words at the meeting of the North of England Association—viz., "The collector's remuneration should be in keeping with his arduous and responsible duties." If gas companies and committees would apply these words in a just and practical manner, we should probably hear less of collectors getting into trouble with their accounts. Can collectors really be expected to discharge, in a straightforward and honest manner, their "responsible duties" when the meagreness of some of their salaries is considered?

In a case like the one referred to, I think it would be not unjust to call upon the members of the Gas Committee to make up the amount of the embezzlement, seeing that they were practically to blame for offering the collector such a pittance. While one fully recognizes the commission of the crime, one cannot help thinking that there is another side to the question. I hope Stockport is an exception in the question of salaries—for its own sake.

April 29, 1896. COLLECTOR.

The London Sea Water Bill.—This Bill came before a Select Committee of the House of Commons last week. Among the witnesses was Mr. Harrison Hayter, Past-President of the Institution of Civil Engineers, who declared that the scheme involved no serious engineering difficulties, and that sea water would be a boon to the Metropolis in many ways. The Committee declared the preamble of the Bill proved.

New Joint-Stock Companies.—The "Liverpool Meter Company, Limited," has been registered, with a capital of £30,000 in £1 shares, to enter into a certain agreement, expressed to be made between the Wirral Engineering Company and others, and to carry on the business of meter manufacturers, mechanical and gas engineers, iron and brass founders, millwrights, metal workers, metallurgists, manufacturing chemists, electricians, suppliers of gas and electricity, &c. The "R.H. Incandescent Gas-Light Syndicate, Limited," has been registered with a capital of £50,000, in shares of £1 each, "to carry on business as manufacturers of and dealers in burners, mantles, and other apparatus used in connection with incandescent gas lighting; and, further, to acquire any other patents, patent rights, &c., and to develop, turn to account, and deal with the same in such manner as the Company shall see fit."

The Proposed Purchase of the Chichester Water-Works.—At a meeting of the Chichester Town Council last Friday, the Mayor moved that an offer of £45,000 be made to the Water Company for their property, subject to the necessary powers being obtained by the Corporation to carry out the transaction. He said that the matter had been fully discussed in all its important bearings in a financial way before the Council in Committee. For some years, there had been a feeling in the City and in the Council that the water-works should become the property of the city; and as they were aware, there had been some dissatisfaction and complaints as to the charges made. At the same time, they all owed a debt of gratitude to the gentlemen who years ago undertook the water supply of the city. He felt that they could not expect the Company to surrender their undertaking at cost price, and that they were entitled to value for their money—the market value—for they had worked hard to achieve the success which had been obtained. He thought the price proposed was a fair one to both the Company and the city. Mr. Buchanan seconded the motion. Mr. Mant considered the price too high, and Mr. Ballard was of opinion that £38,000 would have been sufficient. In the end, however, the resolution was carried.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Bills last week:—

The Fylde Water Bill, the Guildford Gas Bill, and the Ilfracombe Gas Bill were read a second time and committed.

The Aldershot Gas and Water Bill, the Dublin Corporation Bill, and the East Surrey Water Bill were referred to a Select Committee—consisting of Lord Kensington (Chairman), Viscount Powerscourt, Lord Saltoun, Lord Calthorpe, and Lord Addington—to meet on Tuesday, May 5.

The Newcastle-upon-Tyne and Gateshead Gas Bill was recommitted to the Select Committee to whom it was previously referred, in order "to enable certain amendments agreed upon by the parties interested therein, and certain other amendments, to be inserted in the Bill if the Committee shall think fit to insert the same." The Bill will be considered by the Committee on Tuesday, May 5.

HOUSE OF COMMONS.

The progress with Private Bills last week included the following:—

The Huddersfield Water Bill and the Matlock Bath Gas Bill were read the third time and passed.

The Kirkcaldy and Dysart Water Bill was reported.

The Standing Orders of the House having been suspended on Tuesday, a Bill entitled the Yeovil Corporation (Water) Bill—"to enable the Corporation of Yeovil to construct an additional reservoir and other water-works, and to raise money for the purpose by borrowing on mortgage or otherwise"—was introduced and read the first time the following day.

Notice was given by Mr. Ritchie of his intention to introduce three Bills on behalf of the Board of Trade—

1.—Gas and Water Works Facilities Provisional Order Bill, confirming Provisional Orders made by the Board under the Gas and Water Works Facilities Act, 1870, relating to: Amersham, Beaconsfield, and District Water; Burnham and District Water; East Huntingdonshire Water; Hemel Hempstead Water; Maidstone Water; Tilehurst, Pangbourne, and District Water.

2.—Gas and Water Orders Confirmation Bill, to confirm Provisional Orders made by the Board under the Gas and Water Works Facilities Act, 1870, relating to: Fort William Gas; Laindon Gas and Water; Matlock Bath Gas.

3.—Gas Orders Confirmation Bill, to confirm Provisional Orders made by the Board under the Gas and Water Works Facilities Act, 1870, relating to: Chester-le-Street and Pelton Gas; Maidstone Gas; Settle Gas.

METROPOLITAN COUNTIES WATER BOARD BILL.

Debate on the Second Reading in the House of Lords.

In the House of Lords last Thursday,

Lord JAMES OF HEREFORD formally moved the second reading of the above-named Bill, whereupon

Lord TWEEDMOUTH moved—"That the Bill be read a second time this day six months." He said it seemed to him an astonishing thing that a great and powerful Ministry should, in their heyday of first youth and energy, in dealing with a subject of the utmost importance to the Metropolis, have produced a Bill which was so meagre, so colourless, so wanting in originality, and so distasteful to the representatives of the water consumers. When the Bill was introduced, he described it as a Bill to take the control of the London water out of the hands of the London County Council; and the more he studied the Bill, the more he thought that this description was perfectly justifiable and an unassailable one. The Bill proposed to set up a new water authority in the Metropolis, giving them powers, every one of which was now in the possession of the London County Council. The new authority would not, however, be in such a good position to exercise such powers, because it would not be a representative body; and its members would not owe their position to election by the ratepayers. It would have no rating power, but would have to impose its will, in the matter of expense, on the other authorities within the area. He should like to know why the Government had gone against what he conceived to be the precedent of parliamentary authority, by setting aside the existing municipal authority of London and setting up a new one in its place. He had tried to find out a sufficient reason for this course. He naturally set aside as ridiculous the idea that the Government were actuated by any personal animosity or jealousy of the London County Council, or that they believed that that body, if they had these powers entrusted to them, would misuse them. He did so because he could not but remember that the London County Council was the child of the last Tory Government; and, moreover, it contained a strong leaven of members of the House of Lords, while he was informed that many more peers were anxious to obtain seats in its council chamber. As he had pointed out before, the whole trend of parliamentary inquiry and decision was in favour of giving these powers to the London County Council. Throughout the country, all the precedents were in favour of such a course. He could only find two cases of important towns in the United Kingdom where Water Trusts had been set up; and in both instances the Trusts were different from the Trust proposed by the Bill. There was a Water Trust in Belfast; but it was elected by the ratepayers. Its constitution, however, had not proved satisfactory; because, as the records of Parliament showed, the Trust opposed Bills promoted by the Corporation, and the Corporation opposed Bills promoted by the Trust. Edinburgh was the only other case. There the Water Trust was composed of seventeen members nominated by the Corporation, four members nominated by the burgh of Leith, and one member nominated

by the burgh of Portobello. But there was now a Bill before Parliament for the extension of the boundaries of Edinburgh, which would then include Leith and Portobello, and which, therefore, meant a sentence of death on the Water Trust. But, on the other hand, the Corporations of large towns like Leeds, Bradford, Manchester, Birmingham, Glasgow, Leicester, Cardiff, and many others, had bought up the Water Companies within their municipal areas. Many of them were also supplying water to populations outside their areas as great as those which they supplied within their areas; and some of them, like Glasgow, Manchester, and Birmingham, had gone far afield for their water supplies. The one reason for the introduction of the present Bill was that it was absolutely necessary to constitute a water authority for the protection of the areas outside the area over which the London County Council had jurisdiction. On the introduction of the Bill, he ventured to ask which of these local authorities had expressed such a view; but no reply was then given. The answer had, however, now come. On Monday last a conference of delegates representing these bodies met and unanimously passed the following resolution: "That it be respectfully intimated to her Majesty's Government that, in the opinion of this conference, the interests of the County of London and of each and all the surrounding county authorities within what is called in the Bill the Metropolitan Water Area, are so diverse as to make the constitution of a Water Board as proposed impracticable, without injustice to the several areas included therein." It seemed to him that this resolution "knocked the bottom out" of the argument by which the Bill was supported. Indeed, when he heard of the resolution having been passed, he thought the Bill would not be proceeded further with. The area over which the proposed Water Trust was to have jurisdiction was a fresh addition to the several areas with which the Metropolis was at present endowed. The County Council area extended over 121 square miles; the area known as "Greater London" (which included the Metropolitan and City police districts) extended over 701 miles; and now it was proposed to constitute a "Water Area" of 620 square miles, which was a purely arbitrary one, of all the districts and parishes supplied with water by the existing eight London Water Companies. The noble Lord, in introducing the Bill, rested a considerable portion of his argument on the conclusions with regard to the extension of the population in the area outside the London County Council area. But he (Lord Tweedmouth) should like to point out that any argument founded upon the conclusions of the Royal Commission in that respect was, to a certain extent, vitiated by the fact that the area to which the Royal Commission referred was much larger than that proposed to be constituted by the present Bill. Its area extended to 845 square miles; because it was made up of the whole of Greater London, the Metropolitan and City police areas, *plus* those portions supplied by the existing Water Companies which lie outside that area. Therefore the area dealt with by the Royal Commission was some 225 square miles greater than that to which the present Bill applied. Many other areas besides that of the County Council of London were affected. There were 56 separate areas, in each of which there existed a local authority of one kind or another, which, under existing legislation, possessed the power of dealing with the water supply of its district, and in some cases was already actually supplying its population. This was a serious matter, which must lead to considerable confusion and difficulty. As to the constitution of the new Board. The London County Council was to be represented by sixteen members; the City of London, by two; various other county councils, by ten; and the Conservancies of the Thames and the Lea, by one each. The assertion that such an authority should consist of the representatives of water consumers, was met by the answer that it was not proposed to give any representation to the Water Companies. As the Conservancies were interested in the protection of the rivers, by preventing the abstraction of too much water from them, it did not seem right that their representatives should belong to a body whose main duty was to guard the interest of consumers. Excluding the two representatives of the Conservancies, the number of members was 28; and the proportions given to the City and the County of London seemed to be altogether inadequate, having regard to either rateable value or population, of both the districts supplied and those authorized to be supplied. In one case, on the basis of population, London ought to have 21½ members to 6½ from the outside; and in the other case, it ought to have 22½ to 5½. If consideration was to be given to future increase, it must be remembered that there were large areas within the Metropolis unbuilt upon. It was said that the London County Council would be predominant upon the Trust; but if its 16 members represented different sections within the County Council, it might be that the Trust would take action (with means largely provided by the County Council) which the County Council itself would have to oppose. Then the Trust was to have no power to purchase without coming to Parliament; although if there was one thing all were agreed upon, it was that the water supply of London ought not to remain in the hands of the Companies. Mr. Chamberlain had said that he would assent to purchase under the Lands Clauses Act, which added 10 per cent. for compulsory purchase; but the Water Companies had no right to more than the value of their undertakings. The new body was to have power to inquire and enter into negotiations. But past inquiries had been exhaustive; and the result of all had been that it was desirable that these undertakings should be purchased and should be managed by a municipal authority. The proposals of the Bill were against all principle and precedent; they were not expedient in the interests of water consumers; and there was no probability they would satisfactorily solve a difficult problem. He therefore asked their Lordships to assist him by their votes in doing what they could to prevent the Bill becoming law.

The Earl of ONSLOW did not wonder that the noble Lord invited their Lordships not to give a second reading to the Bill. He, no doubt, was greatly disappointed that a matter of this importance should be dealt with by the present Government rather than by the body of which he was a distinguished member, and which had been attempting ever since it came into existence to solve this difficult problem. Both he and the noble Lord had the honour of belonging to a municipal corporation which, perhaps, was the greatest, and wielded authority over the largest area of any municipal authority in the world; and the nobleLord was the representative of the party which had been in a majority, and had directed the policy of the London County Council ever since it came into existence. But within the last thirteen months, a material change had come over the composition of that body; and, although the noble Lord was still the representative of the opinion of the majority, the majority of those who had been sent by the electorate to represent them on the County Council held views diametrically opposed to him, and the proposals which were contained in the Bill were very much those which the Moderate party on the County Council had constantly urged that authority to adopt. The noble Lord continued to direct the destinies of the London County Council, because the party to which he belonged, availing themselves of a clause in the Act of 1888, had appointed a number of Aldermen who, like the noble Lord, had rendered distinguished services to their party; so that the County Council at present was controlled by the dead hand of the former Council. So long ago as 1869 a Commission, presided over by the Duke of Richmond, reported their opion that the future control of the London Water Supply should be entrusted to a responsible public body; and that was followed by the report of Sir William Harcourt's Committee, which recommended that, in the absence of any single municipal body to which these functions could be committed, a water authority of a representative character should be constituted, and a Bill having that object introduced at an early date. At the time the Committee reported, there was in existence a municipal body which, though not popularly elected, was a representative body exercising jurisdiction over precisely the same area as that of the County Council. That it was not meant to exclude such body, was shown later on in the report of the Committee, where it was stated that the single municipal body "should include elements derived from the Corporation of London and the Metropolitan Board of Works, with a due representation of the districts at present supplied by the Metropolitan Water Companies which lie beyond the jurisdiction of the Corporation and the Metropolitan Board of Works." If he had wanted to have a definition of the authority which was set up in the Bill of the Government, he would not ask for any better words than those supplied him by Sir William Harcourt. He should have imagined that the County Council, after the several reports of these Committees and Commissions, would have been content to go upon somewhat similar lines to those there recommended in constituting such authority. But they did nothing of the kind. They found another clause in the report of Sir William Harcourt's Committee which was more to their taste. It implied, under circumstances there stated, that Parliament might consent to expropriate the Water Companies without compensation; and it was upon this basis that the County Council proceeded. They had brought forward several measures, one and all of which had been rejected by Parliament. What was the policy of the Bill now before their Lordships? The noble Lord seemed to think that its only object was to enable the Water Board, when constituted, to promote Bills in Parliament; but that was only one of the many powers to be conferred upon the new authority. In the first place, there was conferred upon it all the powers which were at present exercisable by the London County Council, which were formerly exercisable by the Metropolitan Board of Works, or which were exercisable by any of the local authorities in London; and, more than that, there was given to it a very important power, which now rested, unfortunately, in very feeble hands—that was the power of a certain number of householders to make a representation to the Local Government Board as to the quality or quantity of water supplied to them. What was everybody's business was nobody's business; and it was proposed by the Bill that this power should be given to the representative authority of the Metropolis, which would also be empowered to assist even one individual ratepayer or consumer in obtaining a determination upon any question which might be raised that was likely to be of general interest to all the consumers and ratepayers within the area of the Board. He should like to explain the causes that had led up to the attitude which the local authorities had assumed. When the County Council originally proposed to deal with this subject, they did not (as might reasonably have been expected) invite the local authorities to come to an agreement before suggesting legislation. They thought such authorities would be quite content to receive at the hands of the London County Council water for their inhabitants at such a price as the County Council might choose to sell it; but when they got into the Committee-room, they found not one single local authority which would consent to any such course. When the Bill first went into Committee, they were met by the opposition of one of the outside authorities—the Surrey County Council; and the first impulse of the friends of the noble Lord and the London County Council was not that they should consider the interests of the ratepayers of London, but do something to secure that their Bill should pass, and buy off the opposition against it. So they made an arrangement with the county of Surrey, that the county should have the use not only of all the means of distribution of water, but also of all the sources of supply which were required for their inhabitants within the district. As a member of the Surrey County Council, he congratulated the county on the excellent terms made for itself, and the bad terms made for the London ratepayers. He characterized it as a distinctly profligate proposal. A concession of the kind made to one local authority must be extended to the others; and the result would be that, after the people of London had paid an enormous sum to buy out the Water Companies, they would find themselves deprived in a large measure—in fact, prohibited—from increasing their sources of supply, and deprived of the source on which they at present relied, and be compelled, in addition to the purchase of the Water Companies, to go to a distant part of the country to bring in water they had been deprived of by the action of the County Council. He did not wonder, after these proposals had been offered to the outside authorities, that they would not be content without making an effort at least to obtain some concession of the kind before the present Bill passed into law. But this was entirely a new attitude on the part of the local authorities round London, because, until these profligate proposals were laid before them by the London County Council, they never contemplated anything of the kind. In 1891, when a Bill to constitute a Trust similar to that now proposed was under consideration in another place, the learned Counsel for the

county of Surrey asked that Surrey should have three representatives on the Trust. It was proposed that it should have one. The demands of learned Counsel before Parliamentary Committees were not unlike those of Asiatic traders, who asked three times as much as they would be content to accept. The Chairman of the Walthamstow Board said at the conference that there was a strong feeling in Essex that there should be direct representation on the Water Trust. So until the proposals of the London County Council were made, it was agreed that the only way in which the subject could be dealt with was in the manner proposed by the Bill. Circumstances which might arise in one or other of the counties might not necessarily arise in all. Some local authorities might be quite capable of providing themselves with water without interfering materially with the water supply of London. But it had never been considered by Parliament or the County Council; and he submitted that the clause in the Bill which provided that the Water Board might, if it thought fit, promote a Bill in Parliament for varying the area of the Water Board—that was to say, that before long one or more of these authorities might be established as a separate authority—was one which might reasonably be accepted by the local authorities concerned. In his opinion, it was impossible for any authority other than Parliament, after a long and exhaustive inquiry into the special circumstances of the case, to say whether it was fair and equitable to the rest of the partners to the Trust that one of them should be allowed to leave it. He believed the counties round might fairly place confidence in the justice of Parliament; and if it was possible to meet their wishes, that they might leave the Trust to control their own supply, Parliament would not be unwilling to consent to it. As at present constituted, the only power which the local authorities round London had was that of opposing any Bill which might be promoted in Parliament detrimental to their interests. But under the Bill, the local authorities would be represented on the Board, nothing could be done without their consent, purchase could not be accomplished, a new supply could not be brought in, or the expenditure of money undertaken without their voices being given a full and complete hearing. It was not necessary to follow Lord James through the details of his speech, for the reason that when he introduced the Bill a month ago he said the desire of the Government was not to force the Bill on any unwilling authority, but to act as arbitrator between all the parties interested. Being a strong and powerful Government, they felt they were in a position to bring the matter to a settlement; and they would not lend a deaf ear to any representations or appeals which might be made to them. Without fear of contradiction, he himself would say that, whether they decided to pass or reject the Bill, the action of the Government had brought the matter nearer to a settlement than it had ever been since the days when the Duke of Richmond's Commission sat, and certainly nearer than it had been after the London County Council had been tinkering with the subject.

Lord ALDENHAM, while supporting the Bill, held that the City of London did not obtain the share of representation on the Water Board that the amount of its contributions ought to secure for it.

Lord MONKSWELL, speaking for Kent, said the Bill was subject to one great objection from a practical point of view, and that was that nobody wanted it. At a recent meeting of the local authorities, a resolution was unanimously passed absolutely condemning the proposed Trust. No opposition was offered on behalf of the Government; and he assumed that Earl Onslow was a party to the resolution.

Earl ONSLOW: The members present on behalf of the Government did not take any part in the proceedings.

Lord MONKSWELL said the question of the practicability of separating Kent from the other Water Companies, as to the source of supply, had been carefully considered by eminent engineers, who were of opinion that there was no practical difficulty whatever in the matter. As to the compulsory nature of the suggestions of the London County Council for taking over the Water Companies, the County Council of Kent were now promoting a Bill to buy up the Kent Water Company on the precise terms the London County Council proposed to apply to the other Water Companies of London. The local authorities did not want central control; they desired that each district should control its own supply. With regard to the question of buying up the Companies, the attitude taken up by the Government on this point, in insisting on various clauses being applied to the Companies, made it absolutely impossible that there should be any purchase of the Companies during the Government's term of office. The London County Council were almost unanimous in saying that it would never do for the ratepayers to buy up the Companies on the conditions of the Lands Clauses Act. As to Birmingham affording a precedent in this matter, he submitted that the precedent of Birmingham did not apply to London. The Government had taken up a different position to that which was adopted by the Committee of the House of Commons who considered the question of purchase of the Companies last year. They had taken up the position that they would not listen to any suggestion outside the Lands Clauses Act; and they had refused to consider any alternative. It seemed to be waste of time to go on with the present Bill, because the ratepayers would not purchase the Water Companies at the price they asked.

Lord ASHCOMBE said the water authorities of Surrey outside London asked to be allowed statutory power to withdraw from the Trust if they wished to do so. They believed that the vote of one councillor on the Trust would not give them sufficient power. He therefore did not feel that he could support the Bill. He would not vote against it; but he hoped that in Committee opportunities would be given for introducing amendments which would satisfy Surrey.

Earl DUNRAVEN said the London County Council was not a fit body to take over the enormous duty of supplying this great area with water. They had too much else to do. They had been referred to the cases of other places; but there was no instance to be compared in magnitude with London, whose case was unique, and must be judged by itself. The body proposed by the Bill was an admirable one, and was so framed as to be able to deal fairly with all the interests which came before it, and to treat the whole question in a manner which the County Council could not possibly do. He hoped the Bill would be read a second time, and that it would speedily be passed into law.

Lord WELBY maintained that the Bill would reduce the London County Council to the position of mere paymasters. The noble Lord in charge of the Bill might say that it was only provisional, and that it would have to be supplemented by future legislation. But they must not rely on the well-intended assurances of a Government, and were justified in criticizing the Bill as it stood. It was obvious that rating powers would have to be given to this new body; and he altogether objected to the creation of a new and independent rating authority for London.

Lord JAMES OF HEREFORD: It is well that we should clearly understand what issue is involved in the question of the second reading of this Bill. There may be some members who think that there should be no legislative steps taken, and that the Water Companies should continue still as trading Companies to supply water to this great Metropolitan community. And I gather there are some of the bodies which we have termed "outside areas," wishful still to remain subject to the trading supply derived from the Water Companies. That was not the view of her Majesty's Government in considering the subject and in introducing the present Bill. Nor is that the view of my noble friend opposite. I am sure that he, and those whom he represents, would be the last to say that they wish the trading supply now afforded by the eight Companies to continue in the same position as at present; so I will not trouble your Lordships with arguing that point. We understood there was a great consensus of opinion in favour of some legislative alteration of the present condition of things. We gathered this from many sources—from reports made by Royal Commissions and by Committees of Parliament, and, as far as we knew, from public opinion. We gathered, too, that the example set by the great municipal communities in the country, of taking possession of the water supply, would be one that it would be well to follow, as far as possible, in the Metropolis. And when we look to the fact that members of the same community are now receiving their necessary supply of water from eight different Companies; that these Companies charge different prices; that there is as great a difference as 30 or 40 per cent. between the terms on which water is supplied by the different Companies; and that the difference between the height of pressure of the various supplies is as great—it must seem evident that some legislation is necessary to provide a central body by which water shall be supplied to the same community under similar conditions, and the contest between those different interests shall be brought to a close. What is the issue raised by my noble friend, Lord Tweedmouth, who speaks for a portion of the London County Council and for the noble Lords opposite? Let us strip his proposition of all matter of detail, and look at the principle of it. It is that the London County Council shall take possession of the present water supply of London, and that they shall be made absolute masters of it. Is that a proposition that can be for one moment maintained? Remember it means that the London County Council shall exercise all powers over the water supply of 1,250,000 people who are not represented on that body.

Lord TWEEDMOUTH: On the former occasion, I distinctly stated that I thought that a Statutory Committee of the London County Council, which would include representatives of the outside areas, and be responsible to the London County Council, was the proper body to deal with the matter.

Lord JAMES OF HEREFORD: What does that mean? It means that the Statutory Committee could report or make recommendations to the London County Council, but could effect nothing themselves. The answer "Yes" or "No" to their proposals would be given by the London County Council. In other words, the determination of every matter would lie with a body which would in nowise be representative of 1,250,000 of the people affected. I ask my noble friend whether he can for one moment maintain that a proposition that a body shall have control over the interests of more than a million of people who are to be without representation on that body, is a proposition in harmony with the principles of the Liberal party? That, however, is not the view of the Government, who think that if there is to be a public body which is to control the water supply of London and the surrounding areas, the water consumers and ratepayers interested shall have a voice in the matter; and I am happy to think that we have had of late distinct proof that those on behalf of whom my noble friend has in one sense a perfect right to speak share the views of the Government. The Transfer Bill which was lately introduced in the House of Commons proposed to give to the London County Council what my noble friend has asked for it to-night—full control over the water supply of the areas outside London. Of the 63 members for London there were only seven, including the tellers, who, when the Bill was submitted to the House of Commons, voted that the London County Council should have this arbitrary power. All the others may be taken as having voted for the alternative proposal of the Government, which is embodied in the present Bill. Therefore I say that the Bill, which proposes to give some representation on the Central Board to the outside areas affected by the Central Board, is one that appeals to the sense of justice of the representatives of London. My noble friend also says: "Look at the example of other great municipal towns." He says it has been established by example that all municipalities should take possession of their own water. I admit it; and if London was only claiming to take possession of its own water, this Bill would not have been introduced. The objection is not that London proposes to take possession of its own water, but that it proposes to take water which belongs to outside areas. I admit there are outside areas in connection with some of our great municipal communities in the provinces; but they are small in comparison with the governing central bodies. Can my noble friend find me an instance of one-and-a-quarter millions of water consumers being governed by a body on which they are not represented? If there is a central body of several hundred thousand persons, and an outside area of a few thousand, you may well say that the outside area cannot form a governing body for itself; and that, as a matter of convenience, power over the outside are. should be given to the central authority. But it is not a case of this kind that we have to deal with. Here we have 1,250,000 people living in well-defined areas, and willing to take upon themselves the burden of the government of their own water supplies; and we say it is well that some provision should be made for the representation on the Central Board of those outside areas—that their existence should not be ignored, nor their interests be placed entirely in the hands of the

London County Council—a body on which they have no representation. It has been said by my noble friend that the outside areas do not want the Bill. But why? Because they do not want to be in touch in any way with the London County Council. They object to any alliance with the London County Council; and they ask either that matters should be allowed to remain as they are—which I presume the House cannot agree to—or to give them separate autonomous existence. For my part, if I could give these well-defined outside areas separate autonomous existence, I would do so. But it cannot be done; it is a matter of insuperable difficulty. If it can be shown that these outside areas can take their own water supply and have apportioned to them the water they ought to have, not only to-day but for their further wants, I will undertake to introduce a clause into the Bill giving them greater facilities than they possess as the Bill is drawn, to make application to be discharged from the Water Trust. But at present it is impossible that we could let them go. Remember that the eight Water Companies are not each supplying a separate and distinct area. If they were, we should have no difficulty in the matter. We could say to each area—"Go and manage your own water supply." But we have to deal not only with different areas, but with different Water Companies. We cannot by a clause of the Bill dissect the water supply, and apportion its share to each of the different bodies. There must be full consideration given to the rights of the different Companies; and above all there must be full consideration given to the interests of the water consumers, not only as regards the supply they want to-day, but the supply they may require in the future. It is impossible to deal with these matters in a Public Bill. I say at once that if we thought we could, we should have done so; but after the fullest consideration with those who are best able to advise—and all Governments have, as is known, their advisers in these matters—we came to the conclusion that this is a matter for legislation in a Private Bill, after full inquiry into the different interests involved. Therefore, what the House has to-night to decide is this one single issue—Shall the water supply be given over to the control of the London County Council, or to a body composed of representatives of the London County Council and of the affected areas outside? Several matters of detail were referred to in the course of the debate. Complaint has been made of the representation on the Water Trust of the Conservators of the Thames and the Lea. On the other hand, it is thought that the Conservators of the Thames, representing as they do great public interests, should be able to say how much water shall be taken from the Thames. That is not a question for discussion on the motion for the second reading. Nor do I enter into the question of arbitration. What arbitration clauses should go in, must be a question to be discussed afterwards. It is desired by all that the Water Companies should receive full and fair value for their property. I do not suggest there is going to be an attempt at confiscation. There is nothing unmeritorious in the holding of this property; the most ardent municipalist will not say that, in the provision and possession of a water supply, there is anything disgraceful or that ought to be penalized. Let us find out what is the fair value, whatever may be the means of arriving at it. I understand the Opposition are willing it should be arrived at; and that is the view of the Government. When we ask for a decision on the main issue, I hope it will not be supposed that an attack is being made on the London County Council or upon the majority of its members. Whatever may be the constitution of that majority, there is no one who will not feel that expression ought to be given to the fullest appreciation of the great labour brought to bear on public questions by the London County Council. But what is felt by people in the outside areas, and by many of the residents in London, is that the London County Council has now more work to do than its members ought to be called upon to discharge. The evidence given on the Transfer Bills of last year goes to show that there is no municipality which performs one-tenth of the work; and those who are interested in this question as consumers naturally ask, "Can the duties now performed by the eight Boards of Directors be as well performed by the London County Council?" Recollect how the members are selected—in some instances, I fear, from political motives, and certainly not on account of their fitness to direct a great water supply. Their official existence may be terminated in three years; and they may be succeeded by new men having none of the experience that has been gained by their predecessors. To this body, untrained for the purpose, you are asked to hand over the multifarious duties now discharged by eight Boards of Directors. I am not making any suggestion of general incompetence; but the House ought to pause before adding to the great burden of the duties now discharged by them. I am hopeful that your Lordships will read the Bill a second time. When it comes into Committee, I hope the invitation I gave to noble Lords on the first reading will be accepted, and that we shall set to work to see whether the Bill can be brought into a shape to meet their wishes consistently with carrying out our view, which is, standing apart from all contention, to endeavour to bring about an arrangement which shall be satisfactory to all parties.

Earl ROSEBERY: In view of the voting power behind the noble Lord and in the Unionist party, I believe that no arguments we may use would have the slightest effect; but that does not diminish our objections to the Bill. I was a little struck by the last speech. A stranger coming into the House might have imagined, not that the noble Lord was in charge of this Bill, but that he was objecting to the Bill introduced by my noble friend his predecessor in office. The noble and learned Lord has been arguing, not in defence of his own Bill, but against, as he imagined, the provisions of the former Bill on the same subject. He said that the London County Council proposed, in defiance of all precedent, to take over an area very much larger than their own, and to rule it without representation from the outside. That is an unintentional but a complete misrepresentation of the attitude of the London County Council. What the Council proposed was this—that, like all other large towns, it should have the control of its own water supply; but with regard to the outside areas, it was prepared to give them autonomy, if they demanded it, or (if they preferred it) full representation on the Statutory Committee they suggested. A good deal has been said about there being too much to do in the London County Council already. But there are other duties looming before the Council, which they are not seeking for themselves, but which are to be imposed upon them by the Government. They are, if I understand the somewhat murky Bill which is before the other House, to control the education of London. It is possible those duties may break their back; but I have no apprehension of any such result from their control of the water question. I say that your Board in reality would have nothing to do; and if you are keeping the London County Council from the exercise of these functions for fear of overloading them in the discharge of their duties, you are deterred by a mere phantasm. But the next question that arises is, Who wants this Board, and who wants your Bill? No one wants the Bill. The County Council do not want it; outside Councils do not want it; and the City of London has not moved. Does Hertfordshire want it? One would have thought that one of the three principal champions in opposition to the Bill would have been found in the present Cabinet. The Prime Minister must know that in Hertfordshire there was the strongest objection to being brought under the Bill.

Marquis of SALISBURY: I am sure Hertfordshire does not wish to be brought under the London County Council.

Earl ROSEBERY: That is not the point. The noble Lord rather argued against the machinery of the Bill introduced by my noble friend. Hertfordshire and Ware have a water authority of their own. They are perfectly satisfied with their own water supply, and do not wish to be brought into this unholy alliance. That fact, one would have thought, would have made the Prime Minister a champion against the Bill. The borough of Croydon is bitterly hostile to the Bill. I suppose the noble Marquis will say Croydon does not wish to be brought under the London County Council. Last of all, there is a Principal Secretary of State who, in a report made not more than four or five years ago, condemned by anticipation the very proposal which he will be compelled to champion in the House of Commons. So I say nobody wants the Bill; and you do not want it yourselves. If you wanted it yourselves, you would give the powers you yourselves enjoy in the Local Government Board—powers of an extensive kind of testing the quality of London water, and which also enable the Local Government Board to check and regulate the tariff and quality of the water supplied by the Companies. Where does the interest of the consumer come in in this Bill? You have everybody against you. But I am forgetting there is someone in your favour—the noble Viscount the former Secretary for the Colonies.

Viscount KNUTSFORD: I said that, as we were to be bought out, I would prefer this Bill to the London County Council.

Earl ROSEBERY: I cannot procure for the Government the suffrage even of the noble Viscount. He takes a negative attitude. I do not believe a more wanton Bill than this was ever introduced. I do not believe there ever was a Bill which, in spite of the great majority of the Government, has less chance of passing into law than this Bill. The noble Lord who introduced it made an appeal to the effect that, in the House of Commons, the majority of the London members were in its favour. I am aware that the majority of the London members are in favour of anything proposed by the present Government. But the noble Lord forgot the fact that the Government of which he is a member offered, on condition that the Lands Clauses Act were put in, to support this Bill themselves. So it cannot be said, with regard to the popular suffrage in the House of Commons, that the noble Lord derives any great power from that.

Lord JAMES OF HEREFORD: That was not quite the offer made. The noble Earl refers to the offer of Mr. Chamberlain.

Earl ROSEBERY: No; of Mr. Chaplin.

Lord TWEEDMOUTH: What took place was that Mr. Chaplin informed the gentlemen with whom I generally act on the Council that he would not go into any negotiations whatever unless, as a condition precedent, the Lands Clauses Act were accepted as the basis of purchase.

Earl ROSEBERY: My statement is not affected by what has just been said, because, subject to that condition, the Government were prepared to support the London County Council Bill. I should have been glad if, instead of devoting so much attention to the machinery of the Bill, the introducer of it had devoted more attention to his own. I want to know whether, with the enormous proportion of population and rating power which the London County Council possesses, they are only to have a majority of one on the Commission. That is a point to which he devoted insufficient attention. It is a principle not absent from the legislation of the present Government, that payment and representation are to some extent to be divorced. I think the principle of representation and taxation has been most unaccountably neglected by the Government on this occasion. I think the people of London (whether their representatives vote with the Government or not in support of the Bill) have reason to complain that their interests are to be so completely passed over in the adjustment of that power. I do not know if that is one of the points which the Chancellor of the Duchy is willing to make an open one in Committee; but at any rate it is one that deserves his earnest attention, because without it his Bill is in some sense a reproach to that great area of London and to that Council on which he has passed not unmerited eulogy. I do not know that there is much more to be said about the Bill; because, as a matter of fact, there is little in it, and the objections have been so fully stated by all the bodies affected, that there is little for any objector to say. But there is one principle which I have already observed in the legislation of Conservative Governments—of constituting an apparently representative authority, and then, when it is constituted, running away from it, and being afraid to give it any power. This is not a directly representative body. We do not admire its construction. But it is held up as a representative body; and, as in the case of the London County Council, the Government runs from it when they have constructed it. Why will the Government not trust their own County Council? Why, if willing to take sixteen members from a hard-worked body and put them on a Statutory Committee, will they not open their mouth a little wider and give the power to the Statutory Committee recommended by the Council? Why is it they fail to give their water authority—which, if it affects the matter at all, will delay the settlement of the question—any powers at all? These are points people are discussing

outside. I am well aware they will not receive an extensive echo or cordial reception in this House; but they are questions the Government will have to face, if really anxious (as they say they are) to settle this question on a permanent and satisfactory basis.

Their Lordships divided, and there voted—

For the second reading	96
Against	27
Majority for	—69

HOUSE OF COMMONS COMMITTEE.

Wednesday, April 15.

(*Before Sir* W. CODDINGTON, *Chairman; Sir* L. LYELL, *Mr.* BEMROSE, *and Mr.* JOHNSON-FERGUSON.)

MATLOCK BATH GAS BILL.

At the conclusion of the promoters' case, reported in last week's issue,

Mr. PEMBROKE STEPHENS briefly addressed the Committee on behalf of the Matlock District Council. He contended that, so far as the Matlock Bath and Bridge districts were respectively concerned, they stood on precisely the same legal footing. If the Matlock Bath Council were interested in gas-works, so were the Matlock Bridge Council, with this additional feature—that the gas-works which were the subject of the controversy were in the latter Council's district. Whatever interest the promoters had in the Bill, the Council he represented had precisely the same. Why, then, should the other Council single itself out to promote this Bill? It might be that Matlock Bath was an ambitious little place; but he submitted that they had not made out a case for the passing of the Bill. In order to prove their case, they should have shown that some public inconvenience had arisen, or some nuisance or complaints, which required to be remedied, and it should finally be shown that the Company had injured or annoyed their neighbours, and especially their next-door neighbour. Was there any need for this Bill? Was there any want of gas, any complaint about districts being left in darkness, any roads persistently left unlighted, or any of the usual things they heard complained about in reference to gas companies? None of these things had been alleged; and they were necessary for founding a *primâ facie* case for the Bill. The object of the promoters was simply to get hold of an outside district for purposes of taxation. He submitted that the Bill was ambitious and unjustifiable, and weak in regard to finance. On these points he was prepared, if the Committee thought it necessary, to call evidence.

The CHAIRMAN: I may say that, whatever line the Committee may take at the close of this inquiry, they will not include in it a release of the £20 burden.

Mr. *Waite*, J.P., was then called, and in answer to Mr. SHAW, said he conducted the inquiries as to the extension of the district, and described the method of bringing the districts into unison, and ending in a recommendation that the Matlock Bath district should have an enlargement. The local opposition to this was so great that the recommendation was not pushed. He favoured public authorities holding gas-works; but in the present case he thought the Matlock Bath Council were not financially in a position to buy the works, seeing that they had a sewage scheme in view.

In answer to Mr. BALFOUR BROWNE, witness said he thought the present works were in the wrong position; being too high for a large portion of the district they had to supply.

The Committee then adjourned till the following Monday.

Monday, April 20.

On the resumption of the proceedings this morning,

Mr. BALFOUR BROWNE referred to what had fallen from the Chairman at a previous sitting, involving a comparison between the price paid for gas undertakings elsewhere and the offer made for the works in the present case; and he added that the promoters were willing to increase their figure to £13,000—only £11,500 having been offered up to the present time.

Mr. PEMBROKE STEPHENS declined to discuss the offer.

Mr. COWARD said he was not there to ask the Committee to entertain an offer of the kind.

Mr. *E. Slack*, a member of the Matlock Bridge Council, said that body were unanimously opposed to the Bill, on the ground that the promoters asked for powers to open up roads in the Council's district, as well as to collect money for gas in that district, for the benefit of the ratepayers in Matlock Bath.

In answer to Mr. RAM, witness stated that one objection which the ratepayers of Matlock Bridge had to the scheme was that they desired at some future day to have a free hand to deal with their own gas supply.

Mr. RAM said this was provided for in the Bill.

Replying to Mr. PEMBROKE STEPHENS, witness said that, as a local man, and knowing all the circumstances, he apprehended serious difficulty and annoyance to his district if the powers sought by the Bill were granted.

Mr. RICKARDS next addressed the Committee for the Matlock Bridge Gas Company. He urged that there was no case to meet as to the interference with the boundaries fixed for the Matlock Bridge Gas Company by their Provisional Order of 1891.

Mr. LITTLER, in opening the case for the Company, said he had a considerable body of evidence with regard to the questions of price and management; but he thought it would be unnecessary for him to touch upon these matters after what had fallen from the Chairman. He would, however, call the Company's Accountant to explain the exact position of the accounts, and also two very competent engineers.

Mr. *J. N. Derbyshire*, examined by Mr. LITTLER, said he had been Accountant to the Company for eight years. When he first took up the duties, the accounts were kept on what he should call the cash-book basis; and capital and revenue were not properly divided. He first put the books on the double-entry system, and then went through them from the commencement of the Company in 1858. When doing this, he came to the conclusion that the capital which appeared in the books by no means represented what should be the true capital of the Company. He advised the Directors as to what should be done; but it was with no idea of "watering" the capital, or of enhancing the price of the undertaking in view of possible purchase. Mr. Bell's valuation of the works at £9000, made in 1895, had nothing to do with the proposal of the Council to purchase. There was not the slightest desire on the part of the shareholders to part with their undertaking or to plunder the Local Authority.

Cross-examined by Mr. RAM: At the time of Mr. Bell's valuation, the capital had not been written up; but he went through the works, and said they were certainly within his figure of £9000. He (witness) looked into the matter, with the view of substantiating Mr. Bell's estimate; and he satisfied himself as to about £8600—leaving the remainder for extensions, which did not appear in the accounts.

By the CHAIRMAN: The Local Authority had been for twenty years or more talking about buying, and never doing so; thus rather hampering the Company. When the Directors wrote asking them to make an offer, they felt sure they would not buy. They only said: "Make us an offer, and we will put it before our shareholders."

The CHAIRMAN: But was not that an inference that the Company would sell at some price?

Witness: I look at it in another way—that it is not.

Mr. *Thomas Newbigging*, M.Inst.C.E., examined by Mr. COWARD, said he was consulted by the Matlock Bath Gas Company when they were applying for their Provisional Order. He had made a structural valuation of the works and plant, including land; and it came to £11,750. The works had lately been considerably extended; and this accounted for his figure being higher than Mr. Bell's. They were in excellent order, well maintained and managed; and the site was sufficient for the production of three times the present make of gas. Their weakest point was in the leakage, which, owing to the nature of the district, was rather higher than it should be. The prices charged—2s. 8d. to 3s. 4d. per 1000 cubic feet—were exceedingly reasonable; and this was not due in any way to local advantages. The consumption of gas per mile of main per annum was only 2,689,000 cubic feet; whereas the average in England was 4,591,000 cubic feet. Taking the whole of the gas-works in Derbyshire in the hands of statutory companies and local authorities, the Matlock Bath Company were lowest in their charges, with the exceptions of the three largest—viz., those at Derby, Buxton, and Ilkeston. The capital—£10,000 in shares and £2000 in mortgage debentures—fully represented the structural value of the works, plant, and land. With regard to the proposal to compel the sale of the undertaking to the Local Authority, he did not know of a precedent for such a step in connection with a concern of this character. If the Company had neglected their duty, there might be grounds for such a proceeding; but otherwise he thought there was no justification for the present Bill. A large proportion of the distributing plant and the whole of the works were outside the district of the Council. The actual consumption of gas in Matlock Bath was 12,000,000 cubic feet; in Matlock, 848,000 cubic feet; and in Cromford, 1,688,000 cubic feet. The result was that the manufacture of gas for the two districts of Matlock and Cromford was 16¾ per cent. of the whole; and yet the Council sought power by their Bill to carry to the district rates any balance of profits remaining from the gas undertaking—in other words, to tax the outside districts for their own special benefit. The proposal to take land in another parish for the erection of gas-works was a most unusual one, especially in view of the capabilities of the present site. The £10.000 suggested for the new works was altogether inadequate. If the Council put up works on the site selected, all the mains would have to be re-arranged; and a new main from the works laid at a cost of about £4000. With reference to the spreading of expenditure over a certain term of years, the practice of Parliament had of late been to allow thirty years, but certainly not more than forty. Assuming the term granted to the Council to be thirty years, he believed the ratepayers would be saddled with a serious burden. He estimated the value of the works at about £17,520.

The CHAIRMAN: That is the sale value.

Witness: Yes; but I should claim 10 per cent. upon that for compulsory purchase. In addition, there are debentures to the amount of £2000, which the Council may take over provided they get their Act. This makes a total of £21,270 for the purchase of the works. Adding to that the £10,000 they propose for the new works, which I say is quite inadequate, we get £31,270. To pay interest and sinking fund on that sum for a term of thirty years would come to rather over 5 per cent. per annum, or equal to £1595. Deducting the maintainable profits, £730, from this amount, there is a deficit of £865 yearly, which is equivalent to a rate of 1s. 11d. in the pound.

Examination continued: The suggested saving in the haulage of coal would be equal to 1d. in the pound as a set-off; but, on the other hand, there would be a loss on the carriage of coke, owing to the works being away from the bulk of the population. Supposing the Bill should pass, the purchase should decidedly be by arbitration under the Lands Clauses Consolidation Act. He had for years held the opinion that there was a difference in value between a statutory and a non-statutory undertaking; but recent events had induced him to modify his view. The Chesterfield Company—a statutory one—had within the preceding six weeks been transferred under arbitration to the Local Authorities at from 20 to 22 years' purchase of the dividends; whereas in 1878 the Ilkeston Company, which was a non-statutory one, sold their undertaking at 22 years' purchase. Comparing the value of money then and now, it was something like 28 years' purchase.

By the CHAIRMAN: There was something special in the Chesterfield case. They were charging a high price for gas; and that would undoubtedly influence the mind of the Umpire. But they had done nothing illegal. It was not altogether a question of whether a company was statutory or non-statutory, but whether they were selling gas at a reasonable price.

Examination continued: Assuming that statutory powers gave an enhanced value to an undertaking, and that this would be the effect if the Matlock Bath Company obtained their Provisional Order, he did not think they should be held in reprobation for applying for it. They merely wanted to establish their works on a proper footing. He did

not know of a precedent of compulsory powers of purchase being granted to a local authority under the conditions existing in the present instance. With regard to the capitalization of profits spent in extension of works, in the case of a non-statutory company it was quite a legitimate thing to do, although it was not a wise one. Here the Company, instead of putting money into their pockets, had invested it in permanent works. Parliament always sanctioned the capitalization of money spent in this way.

Cross-examined by Mr. CLAUDE BAGGALLAY: There used to be a great difference in the value of statutory and non-statutory undertakings; but there was not so much now. The use of the Provisional Order was that under it the Company would be able to open the roads without permission. It was true that it would place them under certain restrictions as to dividend and capital powers; but there would be compensating advantages. Witness was cross-examined as to the conditions of transfer in the Falkirk and Chesterfield cases. Asked if he knew of more than two instances since 1878 where less than forty years had been granted for repayment of money borrowed for gas-works purposes, he said he did not; but Parliament was getting more stringent every year. The question here seemed to be really one of price; because if the Council would pay the value of the works, the Company would sell. As to the site of the works, if he had been going to put them up, he should not have placed them where they were; but as they had been up for 44 years, had ample room, and were no nuisance, he should leave them.

Re-examined by Mr. LITTLER: He should not advise the Company, especially knowing the views entertained on the other side as to £13,000 as an extreme figure, to run the risk of going to arbitration. If the ratepayers of Matlock Bath had to pay even the £13,000 and the £10,000 for the removal of the works, he thought they would bring a great burden upon their shoulders. The suggested saving of £730 a year was quite impossible. The Chesterfield case was not comparable with the present one.

The CHAIRMAN remarked that, as Mr. Littler and Mr. Balfour Browne were both present, it would be well for the former to know that the latter had submitted an amended offer for the works, and had suggested that, if the Committee passed the Bill, he would leave the matter to them rather than go to arbitration.

Mr. BALFOUR BROWNE: I said I was prepared to give £13,000 down; but if my learned friend was not satisfied, I was quite willing to leave the amount for the Committee to determine.

Mr. LITTLER: The £13,000 offered is altogether out of the question; it is very little more than the absolute value on the spot. Moreover, the question of purchase is not one before the Committee. I am afraid I could not possibly accept any proposal of the kind, because we do not want to sell, especially to people who we do not believe will ever have the money to purchase.

Mr. *H. E. Jones*, M.Inst.C.E., said he had inspected and made a valuation of the Company's works. He did not see any justification for the intervention of the Local Authority. The undertaking was sound and well administered. The capital was small; and it had been well spent. The gas supplied was pure; and it had the highest illuminating power to be obtained from the coal used, which was the best available in the district. All the manufacturing appliances were of the most modern character; and they were on a scale 50 per cent. in excess of present requirements. The Provisional Order applied for by the Company would really be more advantageous to the general public than to them. He did not see any possible advantage to the consumer by the transfer of the works. If the Company were to receive a sum on the present capital value of their undertaking, it would not be possible for the ratepayers to benefit by it, if the project of converting the existing good works into larger ones, and building others three miles away were carried out. It would, in fact, be fatal to the whole thing. The works were very nice ones, and it would be a sin to move them, and, what was more, it would be a financial blunder. The removal of the works at a cost of £10,000 must be primarily paid for by the consumers, and, if not by them, by the ratepayers. The works the Company had were worth, according to the valuation, £8907 with the land; and a main to connect them with the town would, as Mr. Newbigging had stated, cost at least £4000 more. So that they had to face an expenditure of £12,907 to put them on level terms. If they economized, no doubt it would be by building smaller works that would soon require to be enlarged; and then there would be a greater blunder still. The interest upon £12,907 was equal to 6d. per 1000 cubic feet. He agreed generally with the evidence given by Mr. Newbigging. There was no justification whatever for properly conducted gas-works being in the hands of local authorities; and in the present case no public good could possibly be served by the change.

The Rev. *C. Baker*, the Vicar of Matlock Bath, stated that, until about four years ago, the gas at times was bad; but the gas-fittings were set in order and new burners put on, and since then the light had been excellent. Speaking individually, he was not discontented with the Company remaining as at present.

In cross-examination, witness acknowledged that he had expressed the opinion that the Local Authority should have the gas-works—in fact, he was strongly in favour of it, where he understood things.

The CHAIRMAN: Are you still in favour of the Local Authority purchasing these works, after what you have heard to-day?

Witness: No; but I would rather not discuss that question, because I want to keep myself impartial.

The Committee then adjourned.

Tuesday, April 21.

On the resumption of the proceedings this morning,

Mr. LITTLER addressed the Committee on behalf of the Company. He contended that the promotion of the Bill by the District Council was an invasion of private enterprise such as he had never known to be accepted by a Committee of Parliament; and he trusted it would not be sanctioned by the Committee. He reviewed the history of the Company during their forty years' existence, and said they earned only a moderate amount on the capital invested. In 1870, it was suggested that it might be desirable for the then Local Board to buy the gas-works. But nothing further was done. In 1889 the question came up once more; and again nothing was done. In the meantime, the Company, with small funds and with limited ground, had tried to do their duty, though not always with success. But whatever complaints were made, were only such as might reasonably be expected under the circumstances. When the Directors found these proposals all fell through, they began in 1892 to think about doing something; and in 1894 steps were taken to reconstitute the Company. The first thing was to ascertain the true value of their works; and they employed a gentleman of great ability to undertake the duty. He reported that, before the extensions, there had been £9000 expended upon the concern. Then the consideration arose how this sum was to be represented in the capital of the Company; and Mr. Derbyshire had told the Committee what had been done in the matter. Though all this had been going on during 1894, it was not till May, 1895, that the proposal to buy came. And who were the people who wanted to buy? People who represented a district which could not grow, and which had a rateable value of £9200. The Company's property was worth £20,000; and for it they had received an offer first of £11,500, and then of £13,000, which he was told was quite sufficient. Could it be wondered at that he objected to the Bill, especially when he was informed that the only alternative was to accept the offer or go to arbitration? He told the Directors that they ought not to assent to a sale except upon the terms they originally suggested. The learned Counsel then dealt at length with the precedents cited in the course of the proceedings. His friend Mr. Balfour Browne had, he said, referred to certain cases as illustrations of Parliament revoking concessions they had themselves granted. But in the Matlock case, Parliament had given no concession; and therefore they could not revoke what never existed. It had been said that, because they were a non-statutory Company the District Council could go to the Local Government Board and obtain permission to spend money on a competing gas undertaking. Possibly, in their own district, they could; but not out of it, and the site of the works was outside. They could not supply a foot of gas beyond their district; whereas the Company could supply both inside and outside. The Committee would appreciate, by his learned friend's remark about ruining the Company, the sort of spirit in which they would go to arbitration. They were going to run the undertaking down as a worthless concern. True, it was said that, if the Local Authority wished to supply gas, they should first get rid of the Company upon fair terms. But who was to be the judge of the "fair terms?" Somebody he did not approve of. This was a proposition which seemed to him to revolt against the first liberties of a person owning property. His friend had said the Company were not unwilling sellers. He (Mr. Littler) should like to know where he found that, because there was not a single word in any document addressed by the Company to the Council which showed that they were willing. They put before the shareholders the ludicrous offer of £11,500 (which was rather more childish than the subsequent one of £13,000); and they would not accept it. They had never been willing sellers, and had never said they were. The learned Counsel then proceeded to show that the Chesterfield case was not in the slightest degree a precedent in the present one; and he then passed on to deal with the merits of the promoters' case. Taking first the objection to the site of the present works and the proposal to remove them, he said this would absorb £10,000 at once, and be quite unnecessary. It would involve an alteration of the mains, locate the works in a place where coke was unsaleable, and put upon the ratepayers an expenditure of £450 a year for the next ten years. Next as to the profit. The maintainable profit had been put at about £700 per annum; and £1035 a year would have to be paid to produce it. How were they going to do it? It was absolutely certain that they could not make a penny profit out of the concern. The Local Government Board suggested that the Committee should not pass the preamble of the Bill unless they were satisfied that the proposed purchase was one which it was "desirable that the Council, in the interests of the ratepayers, should be authorized to take." He contended that it was wholly undesirable, and that it was impossible that it could be desirable. This being so, why was he to be dealt with in the way proposed? His shares were worth £10 apiece; and why should he be compelled to accept £6 5s., or take the chance of whether or not an arbitrator would make some little advance. The value of the works, as a going concern, was £20,000, with £2000 added for compulsory sale. In conclusion, he asked the Committee not to break through every parliamentary principle, or that principle which was fair as between man and man, for the sake of gentlemen who had made out absolutely no case for doing either one or the other.

Mr. BALFOUR BROWNE, replying for the promoters, asked the Committee to affirm the principle of the Bill. The Company were, he contended, willing sellers at a price; and this was to be ascertained by an independent tribunal. He assented that the Company's reason for rejecting the offers made was simply to enhance the value of their undertaking. If this were not so, why would they not sell upon one of these terms: Lump sum or arbitration by the Committee or by an arbitrator? The learned Counsel then dealt with the objections raised to the Bill on behalf of the Matlock Bridge District Council. He said they had agreed, in the Order before the Committee, that the Matlock Bath Company should sell the portion of the undertaking within their district. This showed two things: First, that the Council were in favour of a local authority becoming the owners of gas-works; secondly, that the Matlock Bath Gas Company were not unwilling to sell. Why, then, should the Matlock Bridge Council object to the neighbouring Council doing exactly the same in their own area? He could not conceive. They actually wanted to prevent their neighbours doing what they themselves wished to do—viz., become the suppliers of gas. In conclusion, he contended that neither the Gas Company nor the district would be prejudicially affected by the Bill. The Company would have an adequate price for their works, and the ratepayers wished to possess them. It was merely a question of price. He asked the Committee to declare the preamble of the Bill proved; and he expressed the hope that, if they did so, his learned friend's clients would acquiesce in the decision.

The room was then cleared. On the re-admission of the public,

The CHAIRMAN announced that the Committee found the preamble of the Bill proved. They wished to say that, in their opinion, the offer made for the works was far from adequate; and they would, if both parties agreed, state what, in their judgment, would be a fair price, so as to avoid further expense. With regard to the supply of gas beyond the local area, the Committee would require an equality clause for all outside districts.

Mr. BALFOUR BROWNE remarked that the promoters had already promised this.

The CHAIRMAN said it must be distinctly stated in a clause. Then there was the arrangement between the Company and the Matlock Bridge Council, in the event of the Company letting a portion of their works to them. A clause would have to be inserted to have this carried out.

Mr. BALFOUR BROWNE said if a clause was not already in the Bill, one should be put in. The Matlock Bath Council must be satisfied; and the Matlock Bridge authorities would have ample protection.

Mr. LITTLER thereupon intimated that, as far as the Company were concerned, he should take no further part in the discussion.

LEAMINGTON CORPORATION BILL.

This Bill—which was promoted by the Leamington Corporation for the purpose of making better provision in regard to local government and improvement of the borough, and contained clauses relating to the purchase of the gas-works—was before a Committee of the House of Commons on Tuesday, Wednesday, and Friday of last week. Mr. Freeman, Q.C., and Mr. Fleetwood Pritchard appeared for the Corporation; and Mr. Shiress Will, Q.C., for the Leamington Priors Gas Company. In the course of his opening speech on Tuesday, Mr. Freeman stated, with regard to the part of the Bill dealing with the purchase of the gas undertaking, that a petition had been presented by the Company relative to questions which were to be submitted and withdrawn from arbitration. But he was happy to say that this matter had been practically settled; and he hoped would be finally agreed upon within a short time, so that it would not be necessary for it to come before the Committee. This was apparently the case, for on the consideration of clauses, all those dealing with the transfer were passed. A long discussion, however, took place on a clause, which provided a penalty of £5 for injuring meters or for fraudulently abstracting or using gas, or for injuring pipes or fittings; but the clause was allowed to stand. On the question of the repayment of moneys borrowed under the Act, it was decided that the period for the repayment of money raised for extending and improving the water-works, and for the purchase of the gas-works should be reduced from 50 to 40 years; and the period for repayment of the moneys borrowed to meet the expenses of obtaining the Act should be reduced from 15 to 5 years.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Saturday, May 2.

(*Before Mr. Justice* NORTH.)

Incandescent Gas-Light Company, v. Dewey & Co.—Same v. Stanley.

In these cases, Mr. A. J. WALTER, on behalf of the plaintiffs, moved for judgment in default of defence. The learned Counsel stated that the actions were for an injunction in respect of the sale by the defendants in the first case of mantles of the plaintiffs' manufacture, together with burners not manufactured by the plaintiff Company. The patents infringed were the plaintiffs' patents of 1885, 1886, and 1893. In the second case, an injunction was asked to restrain the defendants from selling mantles constructed in infringement of the plaintiffs' patents and from selling mantles in breach of the limited licence granted by the Company, together with burners not of the plaintiff Company's manufacture.

Justice NORTH granted the injunctions asked, with costs as between solicitor and client; and he directed an inquiry as to damages—the costs of the inquiry being reserved.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Friday, May 1.

(*Before Mr. Justice* WILLS.)

Incandescent Gas-Light Company, Limited, v. De Mare Incandescent Gas-Light System, Limited; Incandescent Gas-Light Company, Limited, v. Sunlight Incandescent Gas-Lamp Company, Limited.

These actions were entered in the cause-list "to be mentioned," in order that his Lordship should settle the exact terms of his judgment with regard to the question of costs.

Mr. MOULTON, Q.C., asked, in the De Mare case, that his Lordship should give costs as between solicitor and client. The special fees payable to expert witnesses would amount to a considerable sum in excess of what would be allowed as party and party costs. The shorthand notes had been the subject of arrangement; but he understood that his Lordship had already decided that these costs should also follow the event.

Justice WILLS, after some discussion, gave costs on the higher scale, including the costs of taking and printing the shorthand notes; and he certified for three Counsel on each side.

On the application of Mr. BOUSFIELD, Q.C., for the defendants, execution was stayed pending appeal; the plaintiffs' costs to be taxed and paid, upon the Solicitor's undertaking to return the amount if defendants eventually succeeded.

In the Sunlight case, in which the plaintiffs succeeded on the question of validity, but failed on the question of infringement,

Justice WILLS said that he should make a special order as to the costs. To save the Taxing-Master from hopeless confusion, and in the belief that substantial justice would be done by treating the plaintiffs as having succeeded in respect of matters involving about one-third, and the defendants as having succeeded in respect of matters involving about two-thirds, of the costs of the hearing, he should order that, up to the commencement of the preparation for trial, the costs should follow the events in the ordinary way, but that after this point, the plaintiffs should have one-third of the whole of their costs to whatever part of the case they referred.

BIRKDALE POLICE COURT—Thursday, April 30.

(*Before Mr.* WILLIAM GIBSON, *Chairman, and a Bench of Magistrates.*)

The Quality of the Gas Supplied by the Southport Corporation.

To-day the Southport Corporation were summoned for having supplied to the Urban District of Birkdale gas which was not of the illuminating power and quality provided by the Southport Improvement Act of 1871. There were three separate summonses relating to the 5th, 7th, and 10th of February.

Mr. HORRIDGE (instructed by Mr. J. Smallshaw, Clerk to the Urban District Council) appeared to prosecute; and Mr. J. DAVIES WILLIAMS, the Town Clerk of Southport, defended.

Mr. WILLIAMS said that he had already intimated to the Solicitor for the Urban District Council, that he should raise the question whether the Bench had jurisdiction to entertain the case at all; and he thought it would be convenient to at once lay before the Magistrates the grounds upon which he submitted that the Court had no jurisdiction.

Mr. HORRIDGE suggested that the proper course was for the case to he opened in the ordinary way, and for the Bench to hear the circumstances and facts. When they had heard the case, they could then decide whether they had jurisdiction, and also whether it was a case for conviction.

The CHAIRMAN: I think that will be the proper course.

Mr. WILLIAMS said he must object to that course for this reason: He had communicated with the other side a couple of days previously, in order that they might not bring their witnesses there; because before the Corporation incurred the very great expenses necessary for fighting the case—as he might say at once they were quite prepared and anxious to do—he wanted to be satisfied that the Court had jurisdiction, and that its judgment, if given, would be valid.

Mr. HORRIDGE said the case had already been twice adjourned; and he should oppose any further postponement.

After further discussion, it was decided that Mr. Horridge should open the case before the question of jurisdiction was dealt with.

Mr. HORRIDGE said that the information was laid under section 40 of the Southport Improvement Act of 1871; but he would first read section 38, because it led up to the other section referred to. Section 38 provided as follows: "Within six months after the passing of this Act, the Corporation shall provide, in some part of their works, a proper and sufficient testing meter, furnished with an argand 15-hole burner and a 7-inch chimney, or other approved burner and chimney, capable of consuming 5 cubic feet of gas per hour, with other apparatus proper and sufficient for testing the illuminating power of the gas, and so placed as to test all the gas made by the Corporation; and the Local Board may, if they think fit, provide within the township a like testing meter, with other apparatus, for testing the illuminating power of the gas within the township." This section provided for one testing meter which was to be furnished by the Corporation, and one for Birkdale which might be provided by the Local Board, and which, in fact, was so provided. Section 39 provided that: "Any justice on receiving a requisition signed by not less than five consumers of gas of the Corporation may, by order in writing, appoint some competent person to proceed to the works of the Corporation for the purpose of testing the illuminating power of the gas supplied by the Corporation; and it shall be lawful for the Local Board to appoint some competent person, not being an officer or servant of the Local Board, to test the illuminating power of the gas. The person in either case so appointed, with such assistance as he might require, might at any reasonable hour in the day time, on producing such order of appointment, enter upon the premises of the Corporation, and make experiment of the illuminating power of the gas, by means of such testing meter and other apparatus; and the Corporation or their officers shall afford all reasonable facilities and assistance to the making of such experiment. But no experiment shall be made in the absence of the Manager of the works of the Corporation; and if it shall be proved to the satisfaction of any two Justices, after hearing the parties, that the illuminating power of the gas did not, when so tested as aforesaid, equal the illuminating power which this Act prescribes, or that the Corporation or their officers refused to afford such reasonable facilities as aforesaid, or hindered or prevented the making of such experiment, in any such case the Corporation shall forfeit such sum, not exceeding £20, as the Justices shall determine to be paid to the consumers making the requisition, or to the Local Board so applying as aforesaid." The next section provided for the testing of the gas at Birkdale; and was as follows: "If the Local Board shall provide within the township a testing meter or meters, and other apparatus for testing the illuminating power of the gas within the township, they may, by an order or orders in writing, from time to time appoint some competent person, not being one of themselves or one of their officers or servants, to make experiment of the illuminating power of the gas by means of such testing meter and other apparatus; but three hours' previous notice in writing shall be given to the Corporation of such intended experiment, and the Manager of the gas-works, or some other duly authorized officer of the Corporation, shall have access to the place of testing. If it shall at any time be proved to the satisfaction of any two justices, after hearing the parties, that the illuminating power of the gas did not, when so tested as aforesaid, equal the illuminating power

by this Act prescribed, the Corporation shall forfeit such sum, not exceeding £40, which the Justices shall determine to be paid to the Local Board." They had testings on three occasions in respect to which the information was laid—namely, the 5th, 7th, and 10th of February. He should be prepared to prove that all the requirements with regard to the appointment of Mr. Bellamy, as the gas tester on behalf of the Local Board, had been fulfilled. The proper notice had also been given to the Corporation; and the Gas Manager (Mr. Booth) attended on behalf of the Corporation, all the tests except one being passed by him as satisfactory. With regard to one test, he was not quite satisfied; and it was repeated. All the tests had been made under the superintendence of the Gas Manager. The tests took place at the testing-station in Birkdale. It would be necessary to give the Bench an outline of the history of the case, because, assuming they convicted, they would have to decide as to the amount of the penalty they would inflict. The facts were as follows: The powers of the Southport Corporation previously were under the Act of 1865, which required a lower candle power than was put in the Act of 1871. There was a considerable amount of agitation; and the result was that an independent company was formed in Birkdale, for the purpose of supplying gas under a Provisional Order. But the Corporation at that time was promoting an Act of Parliament; and they met the Local Board and the proposed company in the matter, and paid, he thought, £800 or £900 and all expenses incurred.

Mr. WILLIAMS objected to reference being made to any preceding Act of Parliament.

Mr. HORRIDGE said that, as the Bench would deal with the question of penalty, he was bound to give them the history of the question. The Act of Parliament was there. It was passed in 1871; and a testing-station was provided under it. The question of the quality of the gas began to arise in 1887. Mr. Bellamy had been appointed as tester during all that time; and tests had been made upon many occasions. Only once, however, did the illuminating power, according to the 15-hole argand burner, come to 20 candles. Once it came to within some decimals; but on the other occasions, it varied from 14 to 17 candle power, which was considerably below the proper standard. In 1887 the tests showed the illuminating power to be 14·49 candles. The result was that correspondence took place between Mr. Smallshaw, on behalf of the Birkdale Local Board, and Mr. Ellis, the then Town Clerk of Southport.

Mr. WILLIAMS objected to the case being put in this way. There was a specific charge for an offence committed in February. He had not the slightest objection to matters in 1887 being brought out; but he did not see what these matters had to do with the case.

Mr. HORRIDGE said if he showed that on repeated occasions the attention of the Corporation had been brought to the matter, that the Local Board had time after time endeavoured to get the question dealt with according to the Act of Parliament, he should feel himself justified in pressing for the full penalty. He would put the case shortly; but he wanted to tell them of the character of the case they had to deal with. In 1887 the question was brought before the Corporation, and some correspondence passed. The Town Clerk contended that the Act of Parliament allowed the use of the 15-hole argand burner or other approved burner. This was one of the questions which might now be urged for the consideration of the Bench. The Town Clerk said the Corporation had a right to use some burner which they said was an approved burner; and he acknowledged by the correspondence that, when tested by the burner specified in the Act of Parliament, the candle power of the gas was not that prescribed by the Act. He said what was perfectly true. If they took, say, the incandescent burner, instead of getting the 16 candles which they had by a 15-hole argand burner, they would obtain as high as 35 candles. This question having been raised, the opinion of a very great authority was taken upon the matter; and this was sent to the Corporation. On March 20, 1888, Mr. Ellis wrote acknowledging the receipt of a copy of the opinion given by Mr. Michael, Q.C. They must have had some burner like the incandescent, and so have got quite a different illuminating power than that prescribed by the 15-hole argand. On Feb. 5 last, Mr. Bellamy informed the Corporation that he had, on testing, found the quality of the gas to be equal to 16·25 and 15·93 candles respectively. On Feb. 7 the illuminating power of the gas was found to be equal to 15·90 and 16·20 candles. A similar letter was sent on Feb. 10, when the figures were 16·24 and 16·62 candles. Now the Bench would perfectly understand what he had said with regard to the difference in the burners and the variation in the results; and unless they had the standard, it would be impossible to prescribe any illuminating power at all. The rest of the machinery was in accordance with that prescribed by the Gas-Works Clauses Act; and it was what was called Evans's enclosed photometer.

Dr. BARROW, one of the Magistrates, asked if the atmosphere of the room would not affect the burning quality of the gas.

Mr. HORRIDGE said he expected it would; and that was the reason why, after the test, a corresponding calculation had to be made and allowed. The tests took place at the Birkdale Town Hall; and the offence was the failure to supply the Urban District Council the proper quality of gas. The whole affair took place within the jurisdiction of the county, and not within the jurisdiction of the borough of Southport. It was expressly provided that the jurisdiction of the Borough Justices should be limited to offences committed within the borough; and that the jurisdiction of the County Justices should be co-ordinate to a borough where there was no Quarter Sessions. That was an absolute code; and he would be prepared to deal with any argument referring to the jurisdiction of the Court.

Mr. WILLIAMS then addressed the Magistrates at great length on the question of the jurisdiction of the Court to try the case. He expressed his regret at having to raise the point; but he was sure that, when he told them that the case involved some £10,000 a year, they would at once understand his anxiety to secure a judgment which would have legal validity. If the Court decided that they had jurisdiction, he should be prepared to go on with the case at an early date.

Mr. HORRIDGE, in reply, quoted various cases in support of his contention that the Bench had power to hear the summonses; and he asked that the case should be proceeded with.

The Magistrates then retired; and upon returning into Court,

The CHAIRMAN said the Bench were unanimously of opinion that they had jurisdiction to hear the case; but they were prepared to grant an adjournment, provided the Town Clerk would give an undertaking to pay the expenses of the day.

Mr. HORRIDGE referred to the expense which had been incurred in bringing important witnesses there that day; and asked that the sum of twenty-five guineas should be fixed for the costs.

Mr. WILLIAMS gave an undertaking to this effect.

The hearing of the case was then adjourned until May 28.

The Charge of Misrepresentation by an Incandescent Gas-Burner Seller.

In the "JOURNAL" for March 31 it was reported that a charge had been preferred, at the North London Police Court, against David William Barnett, an agent, for having "represented himself as an agent of the Incandescent Gas-Light Company, and on that representation had induced the prosecutors to purchase burners of inferior quality." Defendant was committed for trial; but at the last sessions of the Central Criminal Court, the Grand Jury threw out the bill.

Theft by a Bogus Gas Inspector.

At the Middlesbrough Police Court on Monday last week, a young man, named Henry Keen, pleaded guilty to stealing a gold lever watch and two silver Geneva watches, the property of Mr. Frank L. Jackson, a jeweller. A boy named Benstein stated that the prisoner came into the shop, and said he was from the gas-works, and wanted to examine the meter. He told the boy that a stove which was near the meter would require a new plate; and then sent him to open the hatchway. Brown then took the watches. He informed the constable who arrested him that the watches were at his lodgings in Lune Street. The defence was that the prisoner was drunk at the time, and did not know what he was doing. The Stipendiary said the prisoner was sober enough to concoct a cunning scheme to get into the shop, and commit the robbery—one of the most impudent he had ever heard of. He sentenced him to four months' imprisonment, with hard labour.

The Power of a Water Company to Cut Off a Supply.

At the North London Police Court, Mr. Paul Taylor was engaged for a considerable time last Wednesday in discussing with Dr. M'Pherson, of Queen's Road, Finsbury Park, the powers of the New River Water Company. The Doctor said he had a house at Mildmay Park from which the water supply had been removed. On Jan. 24 last, an official of the Company discovered a leakage in the pipe under the road, and failed to find the cause in his (applicant's) house. But on the 29th, they opened the road and repaired the pipes of the adjoining house; and then informed him that there was a leak in his pipe. They cut off the supply; and now he wanted a summons against them for what he considered to be an illegal act. Mr. Paul Taylor: Under what section of their Act of Parliament do you apply? The Applicant: I really do not know. Mr. Paul Taylor: Then I must refer you to a solicitor. The Applicant: I am reluctant to incur any additional expense. I have been put to a good deal of trouble and expense already. I say they had no right to deprive me of water without giving me or my agent notice. The rate is paid in advance. Mr. Paul Taylor: Was the house occupied? Applicant: No. Mr. Paul Taylor: And I presume you are here to contend that there was no leakage in your pipe on the 29th? The Applicant: There was none on the 24th when their inspector made the examination. Mr. Paul Taylor: I do not think this Court has jurisdiction with a house of an annual rental of £52. It will be a matter for a Civil Court. The Applicant: I want to have a summons against them for doing an illegal act. Mr. Paul Taylor: And in the absence of the Act showing me that I have power in the matter, I must refer you to a solicitor.

Stealing from Prepayment Meters.

At the Lambeth Police Court last Thursday, John Ingarfield, 20, a fitter's labourer, and Robert Lewis, 27, carman, were charged with being concerned together in stealing from an automatic gas-meter fixed at No. 35, Graylands Road, Peckham, certain money belonging to the South Metropolitan Gas Company. Mrs. Taylor, residing at the above address, said Ingarfield and another man called at her house, and said they came from the Gas Company to examine the fittings. The meter was fixed in the lower part of the house. She returned to her apartments, and afterwards heard the men leave. When they had gone, witness became suspicious, and sent for a constable. She then found that the money-box attached to the meter had been taken away. It was proved by officials that Ingarfield was not connected with the Company; and they also stated that the index of the meter showed that at the time the money-box was broken open, it must have contained 1s. 10d. Mr. Denman said he should send the case for trial. Mrs. Dicker, of Scarsdale Road, Old Kent Road, deposed that on April 4, Lewis called on her and asked to look at the automatic meter. He did something to the meter, and went away, saying he would call again with other workmen. At night she found that the money-box of the meter was broken; and she communicated with the Company. The meter was fixed so high that, in order to put a penny in, she had to get on a stool placed on a chair. Mr. Denman remarked that he wondered the Company did not have actions brought against them for broken arms and legs. A workman in the employ of the Company said at the time the box was broken open, it should have contained 3s. 8d. Two other similar cases against Lewis (who had never been in the employ of the Company) were also proved. Mr. Denman remanded both prisoners.

Wilful Waste of Water at Batley.

At a recent sitting of the Batley Borough Police Court—on the Bench being Messrs. Fox, Critchley, and Keighley—Thomas W. Haley was summoned for wasting water supplied by the Corporation on the 3rd ult. He did not answer when called; and, therefore, the case was taken in his absence. The Town Clerk (Mr. J. H. Craik) appeared for the Corporation. He said the case was brought under the Water-Works Clauses Act, 1863, sec. 17, which provided against the waste of water; the penalty for the offence being £5. Defendant had a washhouse adjoining his house, and both were supplied with water by the Corporation. Just before midnight on the 3rd ult., Police-constable Towler was going his round, and heard a noise as of water running from a tap in the direction of defendant's premises. He found that the water was issuing from defendant's washhouse tap. Between the time named and 5.45 a.m. on the 4th ult., he passed the house frequently, and heard the water running. Haley had been previously warned about wasting water; but the caution had had no effect upon him, so the Corporation had at last felt it their duty to prosecute. They had been at very considerable expense in providing for the borough an abundant water supply both for domestic and trade purposes; and, while they made it clear that it was their wish that the water should be used freely, they desired it also to be known that they would not allow it to be wasted as it had been in this case. If their Worships were satisfied that an offence had been committed, he hoped that they would impose such a penalty as would not only teach Mr. Haley that he had done wrong, but one that would be a lesson to other consumers. Police-constable Towler proved the case. Mr. Oscar J. Kirby, the Corporation Water Engineer, deposed that for some time there had been complaints of waste of water through consumers negligently leaving their taps open for an unreasonable length of time. He had, therefore, received special instructions to watch the matter in the interests of the Corporation. About six months ago, he had a report from the Inspector of the waste of water by the defendant. He went to the place, and saw defendant's wife, and cautioned her. He estimated that the quantity of water that had been wasted was 3000 gallons if the tap was turned half bore, and 6000 gallons if full bore. The Town Clerk remarked that he thought very few people had any idea of the extent of the waste of water that went on by leaving a tap open in this way. The Chairman said the Bench thought the case was clearly proved, and that every ratepayer would see the propriety of judicious use of water. While the Corporation were not wishful to limit the use of water, yet, when wasted, it became a crime. Defendant was fined 10s. and costs. There was a similar charge against Michael Cafferty, who pleaded guilty. This being his first offence, he was merely fined 2s. 6d. and costs. [In the "JOURNAL" for Dec. 24 last, we briefly noticed a paper read by Mr. Kirby, before the Association of Yorkshire Students of the Institution of Civil Engineers, in which he dealt with the subject of the waste of water by consumers. In the course of a letter received from him in reference to the above-reported case, Mr. Kirby remarks: "These proceedings have arisen in consequence of the needless and wilful waste of water by consumers as referred to in my paper. The value of the water thus wasted for the year ending March 25, nearly reached the astounding figure of £7000."]

Shoreham Water Company.—The half-yearly report of this Company states that the receipts for the six months show an increase, and the working expenses a reduction; the profit-balance being £976, which is the largest ever shown. Dividends at the rate of 5 and 4 per cent. per annum on the old and new preference shares, 5 per cent. for the half year on the ordinary shares, and 3½ per cent. on the amount paid up on the new ordinary shares have been declared.

The Development of the Sutton-in-Ashfield Gas Department.—At the conclusion of the recent gas exhibition at Sutton-in-Ashfield, the Chairman of the Gas Committee of the District Council (Mr. J. G. Allsop) entertained the members and officials of the Council to supper. Among the toasts honoured was "Success to the Gas Department," which was proposed by Mr. J. C. Sampson. He remarked that the works were now better managed than they had been for some time past. When the Council purchased the concern from a private Company, the price of gas was 5s. 5d. per 1000 cubic feet; while it was 3s. 9d. at present. Only recently they had spent £6000 upon improvements; so that the Council had now £37,000 invested in the works.

The Fatal Explosion at the Huddersfield Gas-Works.—On the 24th ult., an inquest was held at the Huddersfield Infirmary on the body of Alfred Goodall, aged 44—the second victim of the explosion which took place in connection with the oxy-oil gas plant at the Corporation gas-works on April 11. The medical evidence was to the effect that, when deceased was admitted to the infirmary on the day of the accident, he was suffering from burns on the face and arms. It was at first thought that he would recover; but septic pneumonia supervened, and he died from that cause. The septic pneumonia arose from the burns. Some of the men from the works repeated the evidence they gave at the inquest on Fred Newman (see *ante*, p. 880); and then the Engineer (Mr. W. R. Herring) was called. He stated that the explosion was due to hot air getting into the gas through a porous blister in one of the cast-iron retorts. Since the last inquest, the retorts had been removed from the setting; and where the defect showed itself, the retort had been cut practically in two. He found that the porous blister which he had spoken of was caused by the lamination of the iron in the retort, probably arising from a very slight inherent defect in the casting in the first instance. The metal of the retort appeared to have parted in the middle thickness; and in the heart of it, there was a small piece of scoria that probably floated up on the metal in the molten state, and by some means remained in the interior thickness in the casting. It would have been impossible for anyone to detect it; and the fact that the retort worked so long, proved that it was not a defect that could possibly have been discovered earlier in its life by any external examination. It was really an accidental defect. The verdict of the jury was in accordance with the medical testimony.

MISCELLANEOUS NEWS.

LEEDS CORPORATION GAS DEPARTMENT.

The Finance Committee and the Gas Profits.

A Meeting of the Leeds Corporation Gas Committee was held last Thursday for the purpose of considering a suggestion made by the Finance Committee to the effect that a portion of the profits of the gas undertaking for the year ended March 25, and amounting to about £28,000, should be handed over to the general fund to reduce the existing deficiency on that fund of £48,000, and to obviate the necessity of an increase in the rates for the ensuing twelve months. A deputation from the Finance Committee attended, and laid their views on the subject before the Gas Committee, emphasizing the fact that, unless the latter were prepared to devote a part of their profits to the common fund, the Finance Committee would have no other option than to raise the money they required by the levying of increased rates. With the exception of £992, they pointed out, this £48,000 represented the accumulated deficiencies of years prior to the last one. The deputation having retired, a lengthy discussion took place. A few of the members strongly opposed the suggestion of the Finance Committee, contending that whatever profits were made on the gas-works should be applied for the advantage of the gas consumers, and not for the benefit of the ratepayers as a whole. On the other hand, it was urged that the vast majority of the ratepayers were gas consumers; and therefore by conferring a favour on the ratepayers in not increasing their rates, they would really be benefiting the gas consumers. It was also argued that as the works belonged to the ratepayers at large, and not merely to the gas consumers, any profits that were made should be used for the ratepayers' benefit. Eventually the Committee decided, by 13 votes to 4, to hand over £18,000 to the Finance Committee, £8000 with the view of obviating the necessity for an increase in the rates, and £10,000 to go towards reducing the accumulated deficits on the general fund of £48,000. The remainder of the profits—£10,000—is to form the nucleus of a reserve fund, which it is the intention of the Committee to put on one side for the purpose of lessening the overdrafts at the bank, the interest upon which is now a source of considerably expenditure.

GAS AFFAIRS AT HUDDERSFIELD.

The Fatal Accident at the Works—The Charge for Gas for Public Lighting.

Among the minutes submitted by the Gas Committee at the last monthly meeting of the Huddersfield Town Council were two or three of general interest. It was shown that it had been resolved that the rate of interest on amounts deposited as security for the payment of gas accounts should, as from April 1 last, be at the rate of 3 per cent., instead of 4 per cent., per annum. It had also been decided that in future a uniform charge should be made for the supply of gas to all the public lamps within the borough equivalent to a rate of 2s. per 1000 cubic feet of gas consumed. In relation to the fatal accident which occurred at the gas-works on April 11, by the explosion of an oxy-oil gas-main, whereby two men had died, it was stated that a Sub-Committee had been appointed to investigate the cause of the accident; and the Committee placed on record their sincere sympathy with the relatives of the two men.

Alderman STOCKS, in moving the adoption of the minutes, said it was his mournful duty to tell the Council of the serious accident they had had at the gas-works, whereby two men were injured, one dying the same day, and the other since. He felt very deeply upon this matter, seeing that it was the first serious accident they had had at the works for many years; and he hoped it would be the last for a long time to come. It was truly said by their Engineer (Mr. W. R. Herring) that these accidents were always liable to occur. It happened at the time that the two men were working in the immediate vicinity of where the explosion took place. Had they not been on the ground a £10 note would have made good all the damage done. It was not, however, so much the damage that they thought of; but the loss of the two lives. The deepest sympathy had been expressed by the Committee for the relatives; and so far as they had power to give pecuniary relief, it would be carried into due effect. Proceeding to the other matters mentioned in the minutes, he remarked that it was proposed, after Oct. 1 next, to charge a uniform price of 2s. per 1000 cubic feet for the gas supplied to the public lamps. The Committee had hitherto lost from £1100 to £1200—perhaps £1500—per annum, which was a serious matter for a public department; and he did not think it fair or reasonable that they should have to bear this loss. The gas cost them as much as, if not a little more than, they now proposed to charge. With one exception, Huddersfield was the only town in Yorkshire that did not charge the full cost of supplying gas to public lamps. They did not want to make a profit out of it; all they desired was a fair return for the gas supplied.

Mr. E. MELLOR did not think it was fair to bring the question of public lighting up now. He pointed out that, by the cheapness of the gas supplied, they had been encouraged in the central wards to put up a large number of lamps; and the proposed increase would be a very serious matter for them. Bradford supplied gas to the public lamps free. He thought the new arrangement ought not to come into force until the various Committees had had an opportunity of considering the matter. He moved an amendment to that effect.

Mr. ASTON seconded the amendment.

Mr. SHAW said it might be a serious matter for the central wards, but it was equally a serious matter for the Gas Committee, because, through selling gas below cost price year after year, they were getting into a worse position. If they would look around, they would find that every department almost had considered the Gas Committee to be a proper subject for spoliation, and had had a go at it when they wanted money. As to Bradford, he would ask if Bradford had taken £121,000 from the gas profits? If Huddersfield had not done so, their present

capital, instead of standing at £390,000, would have been depreciated to something like their nominal value, and would have been about £260,000. All these things ought to be taken into account. In addition to selling gas for the public lamps at 1s. 6d., which really cost them 2s. 1d., they had encouraged the sale of gas for manufacturing and cooking purposes at 2s., when it really cost them 2s. 1d.; and, beyond that, they allowed 5 per cent. discount if the accounts were paid in a specific period. On the gas used for commercial purposes, there was a loss of 2d. per 1000 cubic feet, and that branch of the business was increasing, whereas in the other—the purely lighting—there had been a slight decrease, so that the Committee were obliged to take note of their own affairs. He did not want a rate-in-aid, but to do their business in a fair and proper legitimate way; and he desired to see the Committee put upon a proper commercial footing. Had the department been worked on these lines, it would now be in a much more comfortable position than it was.

Alderman STOCKS said he had no objection to this matter being submitted to the General Purposes Committee. All he wished to see was the works put upon a commercial basis.

The minutes were adopted, with the exception of the matter under discussion, which, it was agreed, should come before the General Purposes Committee.

ROTHERHAM CORPORATION GAS AND WATER FINANCES.

The Borough Accountant of Rotherham (Mr. C. H. Moss) has submitted to the Finance Committee his annual report for the year ending March 25. Concerning the gas undertaking, he says that the year just closed shows a considerable improvement on the previous twelvemonth. The sales of gas have increased by £847; but the income from residuals has been reduced by £665, as compared with 1894-5. There is a very substantial decrease in the expenditure; there having been a reduction of £639 in the amount paid for coal and cannel, and of £261 in the cost of repairs and renewals. Rates and taxes and some other expenses have been, on the other hand, greater. The result of the year's trading is a gross profit of £9201; and after deducting the value of the gas used for public lighting and loan charges, there remains a net surplus of £2013. As to the Water Department, the income again shows a satisfactory increase; the domestic supply having produced £132 more than in the previous year, and the meter accounts £131 more. The Rawmarsh Council have also taken more water to the amount of £134. The expenses of the year have been heavy, in consequence of the repairs of the Aldwarke engines and Cranworth Road reservoir; and the cost of pumping has been larger consequent on these repairs. The trading of the year shows a gross profit of £5502; and after debiting loan charges, the year ends with a surplus of £61.

EXHIBITIONS OF GAS APPLIANCES.

An exhibition of stoves and other appliances for the utilization of gas, made by Messrs. C. Wilson and Sons, Messrs. George Bray and Co., and others, is now being held at Bradford, under the auspices of the Corporation. It was opened yesterday week by Mr. W. C. Dixon, the Chairman of the Corporation Gas and Electricity Committee, and will continue until next Friday. In the course of his remarks in declaring the exhibition open, Mr. Dixon asserted that the people of Bradford were far behind those of other towns in adopting methods of cooking by gas. In other places, one in four of the consumers of gas on the average made use of it for this purpose; whereas in Bradford the proportion was only about one in twenty. The results of cooking by gas were, however, far superior to those of cooking by an ordinary open grate. In an open grate, at least 75 per cent. of the heat passed up the chimney, not to speak of the trouble required to maintain an even temperature. In responding to a vote of thanks, Mr. Dixon added that 1000 cubic feet of gas, costing 5s., was equal to a ton of coal, costing 20s. Inasmuch as gas in Bradford only cost 2s. 3d. per 1000 cubic feet, and large consumers were allowed a reduction of 12½ per cent., the use of gas must be considerably more economical than coal. Arrangements have been made for practical lectures on cookery to be given daily by Miss Gertrude Knott and Miss Grace Holroyd, of the Yorkshire School of Cookery; and an offer is made to bake bread and pastry free of charge. An exhibition of Messrs. John Wright and Co.'s cooking-stoves and other gas appliances was held last week in the Town Hall, Beaumaris; the accompanying lectures, which attracted large audiences, being in the capable hands of Mrs. Charles Marshall. All the arrangements were carried out by Mr. G. B. Smedley, the Manager of the Beaumaris Gas and Water Works. The same firm have also been exhibiting at Newport (Mon.) and Ross (Hertfordshire) with Mrs. J. B. Thwaites and Miss Thwaites respectively as the exponents of the art of cooking by gas. From Monday to Wednesday last week, Messrs. W. Parkinson and Co. were exhibiting specimens of their gas appliances for domestic use in the Town Hall, Stourport, with cookery demonstrations by Miss Edith Sanderson twice daily. On Thursday and Friday, the same firm held an exhibition at Bewdley; being again assisted by Miss Sanderson. An exhibition, promoted by the Gas Company, was held at Hertford from Tuesday to Friday last week. The bulk of the exhibits were provided by the Davis Gas-Stove Company, Limited; and there were also on show a variety of burners and other gas-fittings, an assortment of Deimel lamps, and the Welsbach incandescent gas-light. Miss Blanche Cameron attracted good audiences to her cookery demonstrations; and altogether the exhibition was most successful, the credit for which is in large measure due to the Company's Manager, Mr. R. Watson.

Fatal Accident at the Saltley (Birmingham) Gas-Works.—A man named Clarke met with a fatal accident at the Saltley Gas-Works of the Birmingham Corporation last Friday. He was unhooking a chain, which attached a horse to a truck, when by some means he became entangled with the chain. He fell down and the waggon passed over his body, inflicting terrible injuries. He was picked up in an insensible condition, and died almost immediately.

A SCHEME FOR THE SUPPLY OF COKE-OVEN GAS IN MASSACHUSETTS.

In the "JOURNAL" for the 14th ult., we gave some particulars of the above scheme, as set forth in a statement made to the Committee on Manufactures of the Massachusetts Legislature by Mr. H. M. Whitney, the President of the Dominion Coal Company of Nova Scotia, who has applied for an Act to enable him to establish near Boston bye-products ovens for coking the Company's coal, and to supply the resulting gas to various parts of the State. Mr. Whitney was followed by Mr. J. D. Weeks, of Pittsburgh, who bore testimony to the practicability and utility of the scheme. The following are the principal portions of the latter gentleman's statement:—

Mr. Weeks began by saying he had been for twenty-four years interested in the study of coke and coking; and for twelve years he was the expert on this subject for the United States Geological Survey. In this capacity he had visited England, Belgium, Germany, and France, for the purpose of examining and reporting upon coking in bye-products ovens, some 2000 of which he had seen in operation. He then went on to explain how coke is produced, and in what respect it differs from anthracite and bituminous coal. The differences were, he said, chiefly two—the amount of volatile matter contained in them, and their physical structure. Anthracite coal contained from 5 to 10 per cent. of volatile matter, and bituminous coking coal from 15 to 36 per cent.; while coke, which was made from bituminous coal contained from 0·5 to 1 per cent. The other constituents of all of these fuels were carbon and ash. Proceeding, Mr. Weeks said: Now, which of these fuels is the best? Practically a solid fuel with more carbon and less volatile matter is better than one that has less carbon and more volatile matter. So that, pound for pound, anthracite is a better fuel than bituminous coal, and coke better than anthracite, as bituminous coals contain (say) but 61 to 73·75 per cent. of carbon; anthracite, 78·8 to 83·66 per cent.; and coke, 89·5 to 92·5 per cent. The coke is the better. Anthracite is perfectly solid, while the coke is porous—filled with little cells. It is this porosity of coke, combined with its toughness and hardness, that in a large measure gives coke its value as a blast-furnace fuel much superior to anthracite. But this porosity must be kept within proper limits.

Coking is simply the driving off from bituminous coals, by the action of heat, of the volatile matter they contain. No matter how this is performed—whether it be in a gas-works (for the manufacture of illuminating gas is, from one point of view, a coking process) or in a beehive or a bye-products coke-oven—what takes place is always the same. As the heat is applied the coal begins to swell, becomes pasty and sticky, and throws off bubbles of gas. In a word, the coal melts, loses all traces not only of its original form but of its appearance and structure as well, and the particles, freed from volatile substances, unite in a coherent mass, or, as it is termed, "cake" or "coke." As this melted coal solidifies or "cakes," it encloses small bubbles of gas, which make cells, if the gassing process has not been pushed too rapidly. These cells can be made large or small. If the operation is with a small body of coal, and the "gassing" is pushed, you get the weak coke with large cells known as gas-house coke, that will hardly bear its own weight; but if the coking is done under proper conditions, you get a hard, strong coke that will bear the burden of the blast-furnace.

The character of coke from a given coal will depend upon two things—first, upon the heats in the oven or retort; and, secondly, upon the way in which the operation is conducted. The bye-products coke-oven is a retort about 30 feet long, 6 or 7 feet high, and 14 to 26 or 28 inches wide, and is charged with 7 tons of coal at a time. A gas-retort is (say) 9 feet long, 15 inches high, and is charged in the neighbourhood of Boston with, I am told, 250 lbs. to 300 lbs. of coal. There is a more solid mass in the bye-products coke-oven. It is worked slower; but the coal does not puff up so readily. So that, while the processes of making gas and of coking, either in a bye-products or a beehive oven, are practically the same, they are operated differently; and the results in some respects are quite different. This is largely because in the gas-retort the thing sought is gas, and consequently, if necessary, the character of the coke is sacrificed; whereas, in the coke-oven the thing sought is coke for metallurgical purposes, and consequently the oven is run so as to get the proper kind of coke for this use. This is one of the most important advantages of the bye-products coke-oven. You can practically get just the kind of coke you want.

Coking, as I have already stated, is simply the driving off of the volatile matter that is in bituminous coal. It is a process, chemically, of destructive distillation. The gas, as it is driven off, is at first a greenish, yellowish vapour; and finally, the volatile matter (at least the tarry particles) having been driven off, it is almost white. In the gas, or more properly vapour, there are a number of products. The chief of these are ammonia, in the form of gaseous ammonia, which can afterwards be made into sulphate of ammonia, and the well-known coal tar. The amount and character of these products will depend upon the coal used, and largely, even with the same coal, upon the heats at which the coking process is carried on, as well as upon the form of the retorts or ovens used. For instance, the coke will be less and the tar greater in quantity when the heat of coking is 800° C. than when it is 1200° C.; but at the higher heat the coke, gas, and tar will be better in quality than when produced at the lower temperature. So also, the tar and gas from the beehive oven will be of entirely different composition from those given from the bye-products oven.

The forms of oven chiefly used for coking are two: (1) The solid wall oven, of which the beehive is the predominant type; (2) the flue oven, or oven with flues in the wall, of which the bye-products oven is a type. [Mr. Weeks described these ovens.] As to the bye-products from these ovens, as I have stated, the chief of them are ammonia, tar, and gas. From a ton (say) of the Connellsville coal, there are produced 0·29 of 1 per cent. of gaseous ammonia, equal to 23 lbs. of sulphate of ammonia; 3 per cent., or 60 lbs., of tar; and from 10,000 to 12,000 cubic feet of gas. As coke is made to-day in the

United States in beehive ovens, all of these valuable products are lost—allowed to pass into the air. What is this loss on the coke production of the United States? I have here my report to the United States Geological Survey on the manufacture of coke in 1894. The best year's production since these reports were begun was 12,010,820 net tons in 1892, in the production of which 18,813,337 tons of coal were used. Not one ounce of the valuable bye-products from this coal was saved. If we assume that 1 per cent. of sulphate of ammonia, and 3 per cent. of tar, are produced from each ton of coal coked, we lost in the United States in that year 180,000 tons of sulphate of ammonia, which the land is crying for; 540,000 tons of tar, full of all the valuable coal-tar products, as creosote oil, light oils, anthracene, and pitch; and, in addition, 10,000 times 18 million cubic feet of gas. And we are sending all these products into the air! Is it any wonder that Mr. Whitney told you that we were on the eve of a revolution?

One word about the method of collecting these bye-products. Running along the top of the bank or block of ovens is a large pipe, into which the gas evolved in coking passes. The gas from all the ovens flows into this pipe; the result being that a gas of quite uniform composition is produced. As it passes along, the tar is condensed just as it is at an ordinary gas-works. The gas, freed of its tar, passes through the scrubber, in which the ammonia is taken out of it, precisely the same as in gas-works, only on a much larger scale. It is then either purified and enriched, if necessary, and used for illuminating or heating purposes, or it can be returned to the ovens and burned in the flues for coking the coal. In the latter case, there is more gas than is necessary for coking; giving several thousand cubic feet of "tar gas," as well as a large amount of waste heat—the gases of combustion passing out of the ovens in large quantities at 800° to 1000° C.

Passing on to deal with the character and uses of the bye-products, Mr. Weeks said: There are two uses for coke that are of more importance to Massachusetts than its employment for blast-furnace purposes—I mean for foundries and crushed for domestic use. Coke as a foundry fuel as compared with anthracite will melt more iron in less time, requires less blast, gives a minimum quantity of slag, does not clinker, and, if necessary, will carry more scrap. Crushed coke is used for all purposes for which anthracite coal is employed, such as domestic heating and cooking, heating offices and stores, small manufacturing purposes (such as forge fires, smithing, melting-furnaces, cutlery-works, bolt and nut works, smelting and refining, drop forging, welding fires, chain making), coffee roasting, &c. For all of these purposes, coke is a better fuel than anthracite, and cheaper. Exhaustive tests of the comparative values of anthracite coal and coke for domestic purposes—under most favourable conditions for both fuels—show a saving of from 15 to 30 per cent. in the amount of fuel used in favour of coke.

As to ammonia, which is one of the most important—perhaps, in its relation to the future of America, the most important—of the bye-products of coking, I need say but little after the admirable statement made by Mr. Whitney. As to the necessity for fertilizers and the value of ammonia as a fertilizer, throughout all the eastern and western States we hear much of worn-out lands. The worn-out and abandoned farms of New England and the emigration of their one-time occupants to the fertile lands of the West, has been a source of no little concern to those who wish well by this section. These farms have been abandoned though at their very fences almost was one of the best markets for farm products in the land. The restoration of these farms to fruitfulness is largely a question of cheap fertilizers.

Liebig some years ago laid down four propositions regarding fertilization: (1) That, in order to preserve the fertility of a soil, there must be kept in that soil the elements necessary for plant life. (2) Every crop takes out a portion of these elements. Part of what is taken out is added again from the atmosphere; but a part of it is never restored unless it is put there by human means. (3) The fertility of a soil remains unchanged if all of the elements of fertility are restored to it. (4) The manurial product of a farm never can restore all the elements of fertility to the soil. That is to say, it makes no difference how valuable is the barnyard manure produced on a farm, it never can restore to the soil all the elements taken out of it; and therefore fertilizers must be added to maintain its fertility. As already shown by Mr. Whitney, the most important elements necessary to be added to maintain this fertility are nitrogen, phosphorus, and potassium, or nitrogen, phosphoric acid, and potash. The most valuable, as well as the rarest, of these is nitrogen. There are three chief sources of nitrogen: Chili nitrates, ammonia, and the manures either of the barnyard or the green manures. The chief source of ammonia, which is the most important of these, is coal, distilled either in gas-retorts or in coke-ovens. By the use of the water-gas instead of the coal-gas process, the amount of ammonia produced in the United States in gas-works has been very greatly reduced, because in the latter process no ammonia is yielded. It is only in the illuminating coal-gas process that it is produced. Mr. Whitney has already shown you that in a ton of barnyard manure there is about 0·4 of 1 per cent., or 8 lbs., of ammonia; whereas in a ton of coal, coked in these ovens, there are 25 lbs. of sulphate of ammonia, all of which is being sent into the air. As near as I am able to ascertain, the consumption of commercial fertilizers in the United States in 1894 was 1 550,000 tons, in which is included some 31,000 tons of ammonia. If the ammonia from all the coal coked in the United States in 1894 were saved, it would amount to about 150,000 tons of sulphate; and this would yield upwards of 1,000,000 tons of mixed fertilizers, containing 3 per cent. of nitrogen.

Now as to gas. What is the relation between the gas produced in these ovens and that generated in retorts in the manufacture of illuminating gas? There are three gases used for commercial purposes—viz., illuminating gas made from coal; water gas, which is also in part a coal gas made by the well-known water-gas processes; and a producer gas made by burning all the combustible parts of coal with a mixture of air into gas. Coke-oven gas is practically the same as illuminating gas made from coal; and therefore it belongs to the first class. The chief differences in the composition of illuminating and coke-oven gases are the percentages of hydrogen and marsh gas. Roughly it may be said that illuminating gas contains 50 per cent. of hydrogen, 36 per cent. of marsh gas, and, when enriched, 6 per cent. of olefines; while coke-oven gas carries 55 per cent. of hydrogen, 30 per cent. of marsh gas, and, unenriched, 2½ per cent. of olefines. In a word, these gases have precisely the same constituents in different proportions. The coke-oven gas as it comes from the oven is practically an unenriched illuminating gas of 14 to 16 candle power; while the enriched water gas used in Boston has 22 to 25 candle power.

The question has been asked: Can this coke-oven gas be enriched up to as high a candle power as the Boston water gas, and burn without smoking? Most assuredly it can. The simple answer to the question is that smoke is carbon, not hydrogen. Therefore, the more carbon there is in a gas, the greater is the liability of an illuminant to smoke; while the more hydrogen it contains, the less is the liability to smoke, and consequently the larger the amount of carbon that can be carried without smoking. In a word, the more hydrogen, the higher the candle power to which a gas can be enriched. It is more than probable, however, that, when a heating gas like coke-oven gas, can be readily and cheaply procured, some of the incandescent mantle lights, like the Welsbach, will be used, giving a higher candle power with heating gas than can possibly be procured by illuminating gas. Under these circumstances, the question of enrichment is one of no moment. In a Welsbach light, 2½ cubic feet of natural gas, which has little illuminating power, will give as much light in a stated time as 3 feet of illuminating coal gas; and in consuming this 2½ cubic feet of fuel gas, a 60-candle power light is produced. The question, therefore, as to whether the coke-oven gas can be enriched up to 20 or 25 candle power is of little importance. As it comes from the ovens without any enrichment, it will give a 60-candle power light with an incandescent mantle burner, which is the coming burner for using gas for illumination. Further, with illuminating gas at $1·00 per 1000 cubic feet, one of these lights will give 60-candle power for five hours at a cost for gas of 1¼c., or, with coke-oven gas at 50c. per 1000 feet, ⅝c. But should it be desired to enrich it for use in an ordinary burner, no reason can be named why coke-oven gas cannot be enriched that will not apply equally to water gas or coal gas.

As to its value for heating purposes, as compared with illuminating gas, these gases do not differ greatly in their constituents, but rather in the proportion of the elements. In theoretical heating value, the difference is still less. The heat-units in a cubic foot of illuminating coal gas are 625; in a cubic foot of coke-oven gas, 600. This is a difference of 4 per cent., which is so small that, in the estimates of coal I shall make with coke-oven gas at 25c., 35c., 50c., and 75c. per 1000 cubic feet, it may be ignored. When we come to compare coke-oven gas with unenriched water gas, the latter is much the poorer—the heat-units being only 300 to 325 per cubic foot. To raise water gas to a heating power approaching that of coke-oven gas, an expensive process of enrichment is necessary.

Before discussing the practical uses of gas for fuel and power, let me refer to a subject that has been in question—viz., the feasibility, both from a commercial and a practical standpoint, of transmitting this gas from a central station at or near the coke-ovens for a distance of twenty or thirty miles, or even more; and also the feasibility of enriching the gas, at the several points of consumption, by means of a small enriching plant. The first part of this question is simply the one with which we have been dealing in Pittsburgh for the last twenty years in connection with the piping of natural gas to long distances. So little was this question understood twenty years ago—so little information had the best engineer on this subject at that time—that it was doubted if the natural gas under 300 lbs. pressure at the well would force itself through the first gas-pipe line only 19 miles long. To-day, natural gas is being distributed through some 60 million feet of pipe ranging in size from ⅜ inch to 36 inches in diameter. This does not, as a rule, include any pipe in houses, but only the mains, and the service-pipes from them to the owner's property. As to the distance that gas is being pumped, at Greentown, Indiana, there are gas wells supplying Chicago 116 miles distant. The gas from these wells is pumped through two 8 and 6 inch pipe-lines the entire distance. This means that, if coke-ovens were built in Boston, there is no engineering reason, if sufficient pumping-stations were established, why it could not be sent to San Francisco. It may be stated in a general way that a well-equipped pumping-station, costing $27,000, will pump 200,000 cubic feet of gas per hour, or 4,800,000 cubic feet per day.

It seems to me that, after these statements, there can be no question as to the feasibility of pumping coke-oven gas any distance; while as to the practicability of enriching it for illuminating purposes at the point of consumption, what is there to prevent it? What obstacle is there to enriching a gas which contains 25 per cent. of marsh gas and 61 per cent. of hydrogen up to almost any point desirable? And it is a great deal better to do it at the point of consumption than at the point of origin, because the difficulties that come from attempting to convey under pressure the illuminants, which are condensable, are avoided. There are many methods of enrichment in a small way that are feasible, and not expensive.

I now come to a most important practical question: Can this coke-oven gas be used economically for heat and power? I have shown that, in heat-units and chemical composition, it does not differ materially from illuminating coal gas; so that for all purposes of heat and power, it may be assumed that the two gases are the same. There is no purpose for which coal or coke can be used that gas will not serve, except where a burden is to be carried, as in the smelting of iron in the blast-furnace and in the melting of it in the foundry cupola. For all heating purposes in the large mills in Pittsburgh, gas is employed almost exclusively. Where natural gas is not burned, producer gas, which has not one-third of the heat-units per cubic foot which coke-oven gas has, is used very largely.

Let me give a few illustrations of the use of gas. First, it can be used for power. Gas-engines are simply engines in which the piston is driven by the expansive or explosive force of a mixture of gas and air instead of the expansive force of steam. When power is required, there is with them no delay and no waste in fuel, as in the steam plant, in getting up steam; and when the work is done, there is no excess steam to waste. The range of power given by these engines is very great. They are now built from ⅛ up to 750 horse power; and I understand that in Germany gas-engines of 1000-horse power are being constructed. Gas-engine makers guarantee an indicated horse power per hour with a consumption of 15 cubic feet of gas.

Comparing the cost of coal and gas, assuming that an engine will run ten hours a day for 300 days a year, or 3000 hours, we shall have the following figures:—

Coal.—8 lbs. per horse power per hour, at $4 per ton=1·6 c. per hour, or $48 a year; at $6 per ton=2·4 c. per hour, or $72 a year.
Gas.—16·5 cubic feet per horse power per hour, at 50 c. per 1000 cubic feet=$24·75 a year; at 25 c. per 1000 cubic feet=$12·375 a year.

That is, with gas at 50 c. per 1000 cubic feet, a horse power per annum would cost about half what it would with coal at $4, and about one-third what it would cost at $6 a ton; but with gas at 25 c. per 1000 feet, a horse power per annum would only cost one-fourth in a gas-engine what it would cost in a steam-engine with coal at $4, and one-sixth what it would cost with coal at $6. This is only the difference in fuel cost. In the expense of attendance, of stoking, removal of ashes, repairs to boiler, waste of time and fuel in raising steam, and in keeping up steam when the engine is not in use, &c., there is a large saving.

The gas-engine is coming largely into use in Germany for pumping water at small works; 24 cities using gas power for this purpose. At the average fuel cost at these works of $1 per 1000 cubic feet for gas and $2·50 a ton for coal, the cost of pumping a given quantity of water by gas is 60 per cent. of what it is by coal. If you double the cost of coal—that is, make it $5—and divide the cost of your gas, and make it 50 c. per 1000 feet, the relative cost of gas to coal will be only 15 per cent.

Having referred to the advantages of gas as a motive power for street cars, citing the Dessau installation as an example, Mr. Weeks passed on to deal with the use of gas for fuel purposes. He demonstrated to the Committee, by figures, the advantages of gas for heating, cooking, and other domestic purposes; and pointed to the large increase which has taken place in England in the use of gas in culinary operations as the result of the introduction of automatic prepayment meters in connection with gas-stoves.

Coming next to the subject of the bye-products, Mr. Weeks said: The character of the tar, as well as that of all the bye-products in a coke-oven, will depend, first, upon the character of the coal, and then upon the heats at which the work is done. The heats in bye-products coke-ovens being from 1100° C. to 1400° C., the tar corresponds very nearly to that which comes from the gas-works, only it is a little better—that is, it has not so much pitch and carbon in it, as a rule Two analyses made in Germany of tars from the same coal—one in a coke-oven and the other in the Cologne Gas-Works, by Dr. Knublauch—show that, while the gas tar contained 58·4 per cent. of pitch, the coke tar had but 44 per cent.; and while the carbon in the gas tar ran from 15 to 25 per cent., that in the coke tar ran from but 5 to 8 per cent. Now, while the pitch is valuable, it is one of the least valuable of the products of coal tar. Fear has been expressed lest the tar business should be overdone; and it has been. But in America, at least, it has not had a fair chance. There is a demand for pitch (or tar, as it is called) for asphalte pavements; it is by no means an undesirable gas-making material or a fuel; it is used for the preservation of building materials, for paint, for creosoting or preserving wood, for roofing in connection with gravel, for antiseptic purposes, for making lampblack and printers' ink, and for basic steel making. In Europe, a great deal of it is utilized in making the briquettes from slack coal, which is used to so large an extent there; and from it are also obtained naphtha, benzene, carbolic acid, creosote oils, and the great variety of coal-tar products that are so valuable and so important in modern industrial processes. As to its use as a fuel, the average efficiency of coal as compared with tar is as 10 : 12¾—that is, 1 lb. of tar is in efficiency equal to 1·2 lbs. of coal. If coal is $4 a ton, and tar $4·8 a ton, the tar would be worth, as fuel, 2·4 c. per gallon. Tar is also valuable as a source of power. A tar-engine, in operation in Europe, giving 20 effective horse power, runs with 2 gallons of gasified tar per hour.

Bringing his remarks to a close, Mr. Weeks said: So much for the products of coking and their uses. What does all this mean for this State? It seems to me most evident that if Massachusetts is to secure its supply of illuminating gas at a cheaper rate than that prevailing, if it is to avail itself of the greater convenience and comfort of gas as a fuel, the gas cannot be made by either of the two usual gas-making processes—that is, the illuminating and water-gas processes. It is not at all evident how the cost of gas to the consumer can be reduced while the present processes of manufacture, the present methods of distribution, and the present small consumption per head obtain. It certainly cannot be reduced and pay dividends to the stockholders. The reliance for cheap gas, at least for fuel purposes, must be upon the coke-oven process—the carbonization of coal in large quantities, with the production of a metallurgical coke, the saving of the bye-products, and the distribution of the gas from a central station all through the State. Natural gas is pumped 116 miles to-day; and coke-oven gas can be piped as readily as natural gas. From one or more large mains conveying the chief supply, branch lines can be sent all over the State; and if the towns wish it, they can take this gas, enrich it, and use it for illuminating gas.

The Water Supply of North Tawton.—The Okehampton District Council have decided to apply for power to borrow £2700 for works of water supply at North Tawton. The estimated expenditure includes the cost of a cement reservoir to hold 300,000 gallons, an extension of the existing mains, and £900 for the purchase of the rights of the existing Water Company.

Improvements in the Malton Water Supply.—Colonel Luard, one of the Inspectors of the Local Government Board, held an inquiry at Malton, last Friday, with respect to an application by the District Council for the assent of the Board to the borrowing of £2058 for the improvement of the water supply. The proposal is to purchase a new pumping engine and boiler, at a cost of £926, and to erect a water tower and small storage reservoir for the purpose of supplying the higher parts of the town, at a cost of £1138 5s. The latter part of the scheme was not pressed by the Council; but residents in the higher portions of the town urged it strenuously. Mr. Markham, representing Earl Fitzwilliam, the Lord of the Manor, recommended carrying out the full scheme. After hearing evidence, the Inspector viewed the place.

ELECTRIC LIGHTING NOTES.

The 1895 accounts of the St. Pancras Electric Lighting Committee, which were presented to the Vestry at last Wednesday's meeting, show a gross profit of £6575 15s. 4d. on the year's trading, "notwithstanding the exceptional expenditure for repairs and alterations to the mains—a precaution essential to provide against any further possibility of a recurrence of the explosions should gas by leakage accumulate in the manholes and culverts." This nice little sum is sadly reduced, for "after providing £5640 10s. 9d. to meet the repayments and interest on loans, the net profit on the year's working amounts to £935 4s. 7d. This sum, and the balance brought forward from last year, after writing off the item of £554 4s. 7d. for preliminary expenses, in accordance with the resolution of the Vestry on April 17, 1895, leaves a net balance to be carried forward of £2149 6s. 7d. Your Committee recommend that copies of the electric lighting accounts be forwarded to the Board of Trade and the Local Government Board." The detailed accounts show that the total revenue for the year amounted to £18,921 17s. 5d.—a net increase over the previous year of £1990 0s. 10d. Of this, £14,824 15s. 6d. was from the sale of current per meter; £3568 13s. 9d., from public lighting; £463 7s. 1d., rental of meters and other apparatus; £63 16s. 1d., work done on consumers' premises; and £1 5s., from sale of lectures and reports. On these figures, the report claims that, "inasmuch as the charge for public lighting for the year shows a reduction of £857 7s. 4d., the actual increase from private consumers amounts to £2847 8s. 2d., or nearly 23 per cent. increase." The total expenditure was £12,346 2s. 1d., made up as follows: For generation of current, £6737 14s. 5d. (an increase of £561 4s. 6d.); distribution, £2899 12s. 2d. (an increase of £1623 13s. 11d., "being chiefly attributable to the necessity of replacing the whole of the insulators and bearers in the manholes, as a consequence of the explosions in culverts that occurred early in the year"); public lamps, £587 1s. 8d.; royalties, £14 8s.; rents, rates, and taxes, £391 4s. 9d.; management expenses, £1287 14s. 6d.; law and parliamentary charges, £87 13s. 6d.; and special charges, £340 13s. 1d., of which £70 14s. 6d. was for "compensation claims paid for injuries *re* explosions." Deducting the total expenditure from the total revenue, leaves a gross profit of £6575 15s. 4d. This, less the repayments of loans (£1877 2s. 7d.), interest on mortgage, &c., due (£3682 3s. 11d.), and allowances for bad debts (£35 15s. 3d.), and "for reduced value of stores" (£45 9s.), leaves a net profit of £935 4s. 7d. The general balance-sheet reveals the fact that on Dec. 31, 1895, the cash in hand amounted to £28 17s. 5d., and the total liabilities were £120,126 2s. 6d.; while the whole of the amount expended on works—viz., £113,889 2s. 1d.—is counted in its entirety as an asset without a penny deduction for depreciation! The accounts were formally presented by the Chairman (Mr. Sweet); and Mr. Menzies delivered a long and prepared eulogy on the Vestry's wonderful property. It was worth, at the present mart value, at least £160,000; so the Vestry could consider themselves £50,000 to the good. People had sneered because they said they hoped to get the public lighting for nothing; but they were getting on towards this, for the charge for street lighting was now only twice the price of gas, instead of three times, as it was two years ago. He rejoiced to think that the St. Pancras Vestry led the way, and proved that municipal electric lighting could be made remunerative. The accounts were then adopted amid loud cheers. But why did Fate decree that immediately after this pleasant spell of self-congratulation, a letter from the Vestry's Solicitors should be read? This letter reported—*miserabile dictu!*—that the action of a Mrs. Holdsworth against the Vestry for injuries resulting from the explosion in Gee Street had been heard; and that the jury found a verdict for the plaintiff, with damages of £105 and costs. "We were very much surprised at this result," wrote the Solicitors, "as the case was ably argued on behalf of the Vestry, and very fairly summed up by the Judge. But the jury seemed to have made up their minds that Mrs. Holdsworth ought to be compensated." The Vestry eventually accepted their Solicitors' advice, and will not take any further action in the matter. Had the case come on before the end of the year, the net profit would have been considerably less than the much-vaunted £935. By the way, £935 profit on a capital expenditure of £116,149 comes out at about 16s. *per cent.!*

As the result of opposition at a local inquiry, the Board of Trade have declined to sanction the application of the Newington Vestry for a Provisional Order entitling them to supply electrical energy within the parish. A special meeting of the Vestry was held yesterday week to consider the question. The Chairman of the Lighting Committee (Mr. Smithers) expressed the opinion that the Order had been refused on the ground that the Board of Trade had come to the conclusion that the Vestry, even if they obtained the Order, would not be prepared to go on with it. He asked the Vestry to show that this was not so by passing a resolution, stating their willingness to proceed with a scheme. Mr. Westcott did not think they would be wise in pressing this application at the present moment. The Board of Trade had announced their intention not to proceed with the Order lodged by the County of London and Brush Provincial Electric Lighting Company; and the Vestry had therefore secured all they wanted. He moved the adjournment of the Vestry; but the proposal was negatived by 24 votes to 22. Owing, however, to the smallness of the majority, Mr. Smithers withdrew his resolution.

The result of the competition for the best method of dealing with a public supply of electricity in Battersea has now been announced. Mr. Hammond's report as to the relative merits of the schemes was fully considered by the Committee; and in accordance with his recommendation the premiums were allotted by the Vestry in the following order: The Brush Electrical Engineering Company, Mr. W. Best, and Mr. J. Hardie M'Lean. The Vestry at their meeting also adopted the recommendations of the Electric Lighting Committee in respect to the lighting of the Town Hall by electricity, and have decided to put the work in hand at once. It is estimated that the cost of the scheme will be about £3000; and application will be duly made to the London County Council for the necessary loan.

At last the Vestrymen of Lambeth have decided the fate of what Alderman Hubbard persists in describing as "that valuable monopoly"—the Provisional Order granted by the Board of Trade for the electric

lighting of the parish. At Thursday's adjourned special meeting, it was agreed, by a majority of 29, to transfer this Order to Mr. C. W. Sax, that gentleman depositing £5000 with the Vestry as a guarantee. The current is to be supplied at 6d. per unit.

For upwards of two hours last Tuesday the Peterborough City Council were discussing the electric-lighting question. The motion on which all the talk arose ran as follows: "That, in view of the information acquired by the Council since Jan. 28, 1896, it is undesirable to proceed at present with the application for leave to borrow £20,000 for electric lighting supply, and that such application be therefore withdrawn." The proposition had been signed by several members of the Council; and the mover of it was Mr. Batten. He gave some figures, showing that the estimated cost of the scheme had grown from £12,500 to about £20,000. He also pointed out how idle it was to compare Peterborough with Brighton, St. Pancras, and Manchester, or other large cities in which there must be a great and increasing demand for light. Other towns, he argued, were a warning, and not an encouragement to them. Only in 51 towns in England at the present time were the works in operation in the hands of the municipal authorities; and there were 50 companies. So that opinion was much divided as to whether it was a matter for municipal bodies to deal with. He also asserted that the number of lamps promised to be taken within the area of supply was 1046, one-third of which were to be taken by members of the Council. (This statement was met with cries of "Oh.") The total number of people who wanted the light was only 38. The opponents of the scheme came in for a good deal of criticism; and the debate ended by the rejection of the motion by twelve votes to eleven—showing that there is an almost equal division of opinion among the councillors as to the desirability of embarking upon this—anyway for Peterborough—hazardous enterprise.

At the St. Helens County Court last Thursday, Samuel Tate-Chadwick and his wife, Barbara, sued the British Insulated Wire Company, of Prescot, for £50, compensation for injuries sustained by Mrs. Chadwick by reason of the negligence of the defendants. The defendant company some short time ago were laying some electric lighting wires in St. Helens; and the money was claimed for injury sustained by reason of the Company having wrongfully suffered an excavation made by them to be negligently left open and unprotected, whereby the female plaintiff fell into the excavation and was seriously injury. When the case was called, it was announced that it had been settled; defendants agreeing to pay £40 in settlement of the claim.

The Electric Lighting Committee of the Middlesbrough Corporation had before them last Wednesday a report by Mr. R. Hammond, who had been requested to submit an expert opinion as to the advisability of installing the electric light for public purposes. The report was in favour of an installation to cost £21,000; but, after full discussion, the Committee decided to proceed no further in the matter at present.

Among the business to be considered at the meeting of the Manchester City Council to-morrow is a proposal to apply to the Local Government Board for sanction to the borrowing of £100,000, for the purposes of extending the electric lighting plant.

The Lighting Committee of the Chelmsford Town Council have renewed the town lighting contract with Messrs. Crompton and Co. for a further five years; the terms—£22 10s. per annum for arc lamps and £2 6s. 10d. for each incandescent lamp—being as previously. The Committee have also received an offer from the Company to sell the proposed new electric lighting station as a going concern, the entire plant and goodwill, together with the firm's Provisional Order. The price asked is £34,828. The Committee have not come to any conclusion; and the matter is to be considered by the whole Council.

The Liverpool District Electric Lighting Company have made an application to the Board of Trade for power to supply electricity in the districts of Garston and Much Woolton; and an inquiry was held into the matter by Major Cardew last Tuesday. The Garston District Council opposed the application; but it was asserted, on behalf of the Company, that there was no *bonâ-fide* intention on the part of the Council to undertake a supply. The application was supported by three members of the Council. The Chairman (Mr. E. W. Turner), on the other hand, denied that there was any idea of shelving the question, and objected to the Council being "rushed" by a Company whose simple object was to make a profit out of the district. The representative of the Company intimated that they were willing to a clause being inserted in the Order to the effect that it should not be put into operation if the District Council had by June next year submitted an application for similar power.

The annual report of the Hastings and St. Leonards Electric Lighting Company was noticed in the "JOURNAL" last week. We have now before us the report of the proceedings at the meeting of the shareholders, as published in the "Hastings and St. Leonards Observer," the proprietor of which is one of the Directors of the Company. Consequently, it is in the nature of things that his reporter should head his account of the meeting with the words "A Hopeful Future." But just now the shareholders are thinking of the disappointing present; and, when they turn to the future, they remember that for two years they have had no dividend, that the capital expenditure is increasing, and that until June, 1897, they are saddled with a contract for the lighting of the sea-front which has proved unremunerative. A substantial sum of money was spent in providing additional plant when the Company undertook the lighting of the front. There is the possibility of the Corporation not caring to renew the contract at a higher figure; and then the Company would have the capital spent on this extra plant lying idle. Besides this, the increasing competition of the incandescent gas-light must now be taken into consideration. So that, altogether, the future is not perhaps so "hopeful" as the shareholders could wish. Turning to the proceedings at the meeting, the present Chairman (Mr. F. A. Langham) has only occupied the position for a year; and, in addressing the shareholders, he expressed regret that he had to submit for adoption such a sorry account. He, however, had a few cheering items to refer to—one being the increase of £1302 in the receipts on the lighting. But, on the other hand, there was an advance in the cost of production of £892. The net increase in income was only £237. He also mentioned that they were adopting the Brighton system of charging for current, which system he described as a difficult matter to carry out, and he was not quite sure whether it was beneficial to the greatest number of consumers. In September last, the Company commenced running all day, as the consumers naturally wished for the same facilities with the electric light as they had for gas; and this had increased the expenditure for coal. The public lighting had also been a very bad loss. Among subsequent speakers was Dr. Allen, who said that, in common with other shareholders, he was very much disappointed with the report; for they had expected at least a small dividend. On looking through the reports for the last three years, he found four reasons why the Company was in its present state—the installation losses, a very great increase in the capital, to about £19,000 in 1894, the unprofitable lighting of the Sea-front, and the cost of producing the current. The increase of the capital was a very important question; and, judging by the returns, he did not think it was good business. Regarding the manufacture, coal had cost more than half as much again as in the previous year. He supposed this was accounted for by the whole-day running; but they could not for the accommodation of the consumers carry on the works at a loss. The motion was adopted.

The Canterbury Town Council have at length come to a definite decision on the subject of electric lighting. Last Saturday, they resolved to apply to the Local Government Board for authority to raise a loan of £20,000 for the purpose, and to appoint an engineer to prepare plans for the necessary work.

ELECTRICITY AND THE WELSBACH BURNER AT BALLARAT, AUSTRALIA.

It is now some twelve months since a Company introduced electric lighting to the well-known goldfield city of Ballarat. The Crompton Company supplied a plant capable of serving about 50 arcs and 400 or 500 incandescent lamps of 16-candle power. A Syndicate of local men floated a Company to purchase this plant, but met with very poor success in the endeavour to place shares. After strenuous efforts—including a house-to-house canvass—only some 3000 shares were subscribed for by the public at 10s. each. It appears that the Syndicate originally subscribed £1500, for which they received 12,000 shares nominally paid up to 10s. each. The knowledge of this, and the fact that no electric company in Australasia is paying dividends, probably accounts for the difficulties experienced in placing the shares. It is said that the majority of the 3000 shares were taken up by members of the Syndicate and the workmen employed.

Ballarat has only one important street, in which nearly all the principal shops, public buildings, and banks are situated. Hence the scope for electric lighting is very limited; and the difficulty of securing a payable business is still further increased by the fact that the shops only light up once a week. The few exceptions to this very general rule are the only shops which at present use electricity. There are some twenty arc lights in the streets, twenty-five at the railway stations, and ten placed under the shop verandahs. About forty consumers are fitted up with some three hundred 16-candle power incandescent burners.

It is about eighteen months since the Welsbach burners were first introduced into Ballarat; and already there are nearly 2000 of them in use. The principal shops, hotels, clubs, Mechanics Institute, and reading rooms, School of Mines, and many public buildings, are using the light; and already, through this agency, some 25 per cent. of the electric consumers have returned to the use of gas. Others besides have signified their intention of following suit, as soon as their contract time with the Electric Company expires. As evidence of the popularity of the Welsbach burners, during the past twelve months the Gas Company have fitted under the verandahs of the principal shops in the city over 100 lamps, each containing a cluster of three Welsbachs. With the advent of lower prices, it is confidently anticipated that the whole of the business establishments will adopt this new light. The Gas Company have already approached the Town Council with an offer to substitute, at a reduced cost, Welsbach lamps in place of the present electric arc lights; and the matter is now under consideration by the Council.

In the meantime, the Electric Company—having failed to raise the desired amount of capital in Victoria—are, we believe, sending a representative to England, where the public will be asked to subscribe to their funds.

GAS SUPPLY IN BEDFORDSHIRE.

At Bedford a few days since, Mr. E. Ransom delivered a public lecture on gas manufacture and supply. The style of the lecture was such that it could not fail to interest and be well understood; and it covered a very wide field—from the inception of gas lighting down to a short account of the present knowledge concerning acetylene. It is, of course, unnecessary to follow Mr. Ransom through his lecture in these columns; but interspersed in it were references to the gas supply in Bedfordshire, and these we have extracted. The chair was taken by the venerable Mr. George Hurst, who, the lecturer stated, was born in that county in the year 1800; and the Bedford General Library and the Gas Company shared the distinction of having his unique personality at their head. Both of these undertakings dated from the eventful reign of William IV. The old Bedford Gas-Works in Priory Street dated from 1833; and the new ones from 1864. Some little retorts set up as posts by the towing-path in King's Mead near Cardington Mill were supposed to be relics of early gas making in Bedford. The first Act of Parliament empowering the supply of gas in London was passed in 1810. That was the root of The Gaslight and Coke Company, which now served 90 square miles. Gas Acts for new companies and for increasing the powers of existing companies had passed Parliament every year; averaging from eight to ten per annum for the last 25 years. A vast number of the smaller gas concerns, including most of those in Bedfordshire were carried on without the powers and the obligations given by Act of Parliament. The Bedford Water-Works were under

municipal management; but no gas-works belonged to a public body in that or any adjoining county. Three local Gas Companies—viz., Hitchin, Luton and Bedford employed an exceptionally small capital. In dealing with the material from which gas is produced, Mr. Ransom mentioned an extraordinary experience which occurred in connection with the Moscow Gas-Works one winter, as related to him personally by the Engineer (Mr. Leslie). The great viaduct over the Volga, near Tyver, was burnt down; and this stopped the transit of gas coal from St. Petersburg. The Moscow Corporation tried to baffle Mr. Leslie in the efforts he made to obtain wood, resin, grease, &c., gloating in the prospect of confiscating the whole works as the one-sided concession so stipulated if the supply of gas were discontinued for 48 consecutive hours. Yet Mr. Leslie filled his retorts day after day, and triumphed! In speaking of the method of measuring the illuminating power of gas, the lecturer said that a specimen of the Bunsen photometer, as prescribed by the Gas-Works Clauses Act of 1871, was to be seen at the Bedford Gas-Works. But the Corporation, beyond appointing an inspector for a year or two, had never taken steps to inform themselves of the luminosity of the gas; and, it was believed, they had only once formally inspected the instrument. The illuminating power of gas at Bedford, Leighton, and Luton was generally maintained at about 17 candles. At the close of the lecture, the Chairman proposed a vote of thanks to Mr. Ransom, and referred to some of his own reminiscences of the early days of gas lighting. One incident, he well remembered, occurred one night when he was in Fleet Street, near the old office of the "Globe" newspaper (that was one of the first streets of importance lighted in London). The gas suddenly went out; and in mentioning the matter, the paper made this pun: "The Globe was left in entire darkness." With reference to the gas supply of Bedford, some gentlemen spoke very disparagingly of their system; but it was very extraordinary that these very gentlemen never took the trouble to walk down to the works, and test the matter for themselves. Canon Haddock, in seconding the motion, said that instead of gas approaching its end, it was now only in its infancy; and the enormous improvements which were going on would astonish their successors still more than they would themselves. The motion, having been passed, was acknowledged by Mr. Ransom.

THE PROJECTED TRANSFER OF THE PORTSMOUTH WATER-WORKS.

A Scheme before the Town Council.

A Special Meeting of the Portsmouth Town Council was held last Tuesday—the MAYOR (Mr. T. J. Young) presiding—for the purpose of considering a report by the Water Committee dealing with the projected acquisition of the local water-works undertaking. The proposals in the report were: 1. To create Corporation stock sufficient to represent the dividends payable at the time of taking over. 2. To create stock sufficient to pay off the debenture debt. 3. To enter into the obligation as to the staff of the Company, excluding the Secretary and Auditors, but including the Consulting Engineer. 4. To agree to pay seven years' fees to the Directors and Auditors, and to pay the Secretary £500 per annum, or at his option a sum sufficient to purchase such an annuity. 5. To agree to pay the costs both of the Corporation and the Company in completing and carrying out any agreement, including the costs of the necessary Act of Parliament to confirm any such agreement.

Alderman T. SCOTT FOSTER, in moving the adoption of the report, said that, in accordance with the instructions of the Council, the Committee had been in negotiation, and had had several interviews with the Directors of the Water Company. As a result, he was sorry to say that they found that the Directors demanded a somewhat higher price than they did when they met them two and a half years ago; and they demanded this increase notwithstanding the fact that no fresh capital had been required in the interval. It was the duty of the Town Council to find out the lowest possible purchase price, the exact terms, and then submit the matter to the ratepayers. In the meantime, they should educate the ratepayers on the question. On the other side, it was for the Directors to submit the terms to the shareholders; and he thought that if they could come to some agreement with the Directors, there would not be much doubt about the others. In reply to a question, he added that an abstract resolution had been passed approving of the purchase of the water-works, and instructing the Committee to arrange terms.

Mr. BISHOP did not think that he could go so far as to vote for the report that day, because he should like to have further information on the subject. There was, for one thing, no information as to the amount of stock that was to be created; and he thought they should certainly know that. There was also one other matter he should like to call attention to. He knew that very serious expenditure would gradually come upon the town in reference to the renewal of the water-mains. He had known street after street of mains which had to be taken up. Many corporations which had purchased their local water-works had found it a serious matter of expenditure in keeping the mains in proper order. They ought, at Portsmouth, therefore, before anything was done, to have a report as to the state of the mains. At present there was no information on this point. Continuing, he said that about eighteen months ago Alderman Scott Foster made some strong observations in reference to a "declaration of war" against the Directors of the Water Company over the excessive charges made. Now they were asked to compensate those very Directors for the excessive charges. If the Corporation took over the Company's property, they would, to be consistent, have to forego the excessive charges; and this would leave them in a great difficulty. If the Corporation purchased, he was sure there would be a deficiency; and this deficiency would lead, he thought, to the removal of the half-a-crown limit. The water-works ought to have been acquired long ago; but now they were asked far too much, and he thought it was better to "leave well alone."

Sir WILLIAM PINK said that in 1870 he knew they could have acquired the Company for something like a million; but probably now a sum of a million-and-a-half would be required.

Alderman SCOTT FOSTER: £1,036,000.

Sir W. PINK (continuing) said it was a very serious matter for them to undertake the responsibility of going to Parliament and asking for power to borrow a sum of money to pay the shareholders not merely 10 per cent., but the price they would be able to obtain if the shares were put on the market. One great improvement he wanted to see was cheaper rates for mineral water manufacturers. In this respect they had a great grievance in Portsmouth. He drew attention to the fact that Sir Frederick Bramwell had said that the average life of a water-main was about 34 years; and he (the speaker) understood that some of the water-mains in Portsmouth had been laid down since 1857. He had made inquiries of the men at work on the surface drainage; and, generally speaking, they had told him that the water-mains and pipes were in very fair order. But they could not expect to have the increment which Alderman Scott Foster sketched out, without responsibilities on their side—including the taking up of old mains and the putting down of new ones. It appeared to him likely that the purchase of the Company would result for some few years in a loss. He did not think that the Directors should be asked to give up their directorate without being fairly compensated.

Mr. F. G. FOSTER was in favour of the proposition; saying that he thought that if the Directors were paid an amount equal to the salary for the number of years for which they were elected, it would be ample compensation.

Mr. BREWIS also objected to giving a single sixpence beyond full value for the property.

Alderman EMANUEL was in favour of the resolution. He quoted statistics to show that in Sheffield, Manchester, and Birmingham, where the Corporations had taken over the water supply, the result had been most satisfactory and profitable to the ratepayers.

Messrs. WARD and PALIN were also in favour of the proposition, although the latter contended that the Directors had shown a Shylock-like character in their demand for compensation.

Alderman SCOTT FOSTER (in reply) said the main point of difference was now some £4000 to £8000. Would it not, he contended, be suicidal to lose the purchase of the works for a few thousand pounds? As to the rateable value of the town, it must go up; and the Water Company were at present receiving the benefit without any extra expenditure. If the Corporation took over the works, they would reap this benefit themselves; and in a few years they would be able to pay something for the relief of the Urban rate.

The report was then put to the vote, and carried by 31 to 2.

Alluding to the terms of purchase now suggested, the "Portsmouth Evening News" says: The shareholders are legally entitled to the sum of £27,448 17s. 4d. per annum as statutory dividend. To pay this annual interest, £915,000 of consolidated stock would be required. But there are other liabilities which must also be taken over, which, for the sake of clearness, we will set out in detail:—

Loan capital	£104,500
Annuity for the Secretary	3,550
Directors' fees, seven years	5,880
Back dividends unpaid	4,133
	£118,063

This amount, together with the £915,000, would mean consolidated stock to the amount of £1,033,063. But we are not yet done. A Bill would have to be promoted in Parliament and expenses incurred in the transfer, which would involve perhaps another £6000. This would bring up the total of consolidated stock close upon £1,040,000. If this sum could be formed into unredeemable stock, the matter is quite simple; but the Government insist upon the stock being redeemed within a stated number of years. Consequently, in addition to the interest, a certain sum must be set apart annually for redemption of capital. It is not yet certain what number of years Parliament would allow for repayment; but in undertakings of this kind between 80 and 90 years is usually understood to be the limit for repayment of the capital. Assuming 80, 85, and 90 years, the sums annually required for payment of interest and redemption of capital respectively would be as follows:—

For 80 years	£34,436 9 7
For 85 years	33,952 17 7
For 90 years	33,546 4 9

The next question to be discussed is the income derived from the water supply. For the year ending Sept. 25, 1894, the net income from water-rates, &c., was £31,737 17s. 6d., after all current expenses and maintenance charges were paid; for Sept. 25, 1895, £32,434 9s. 1d.—an increase of £696 11s. 7d. per annum. And as the rateable value of the borough increases, this sum will increase in a similar ratio. But if the undertaking were taken over by the Corporation, certain savings would be effected which increase the net revenue—to wit, the Secretary's salary and the Directors' fees, which together amount to £1340. This would increase the revenue to £33,774 9s. 1d.; and many who have given attention to this matter say that further savings could be effected. But as we are dealing with facts, we must not go beyond these facts. Now, on this basis, if the money were borrowed for 80 or 85 years, there would be an annual loss; if for 90 years, there would be a profit. The questions, then, for consideration are these—For what number of years can this money be borrowed? And what is the probable increase in the rateable value of the borough? The first question can only be settled by Parliament; the second is a question of the law of probabilities. For the last ten years the rateable value of the borough has gone on increasing at a very rapid rate; and judging from building operations going on on all sides, there seems every reasonable ground for believing that the rateable value will increase still more. As every increase in the rateable value increases the revenue derived from the water supply, there would be a surplus over and above what would be required to meet the permanent charges if the money could be borrowed for 90 years. This is clear, assuming that the management under the Corporation would be as economical as under the present directorate. But while laying this matter before the ratepayers, we would not for one moment lead any of our readers to believe that

no further risks are to be incurred. . . . We have an approximate idea of the revenue derived from the water-rates, and the probable rate of increase in the rateable value of the borough. What the ratepayers now wish to know is this: What amount will probably be required during the next 15 or 20 years for repairs and maintenance over and above the average sum hitherto paid by the Water Company. When information upon this point is forthcoming, the ratepayers and the members of the Council will be in a position to judge as to the practicability or non-practicability of the scheme. Should any extensive repairs or alterations be required during the next 15 years, it will be manifest that the margin of profits which would accumulate during that time, even allowing for the expansion of the town, would not be sufficient to meet any extraordinary expenses which might have to be incurred; and the improvement rate being limited to 2s. 6d. in the pound, no money can be obtained from this source. This, then, is the crux of the whole question, upon the satisfactory determination of which the entertaining of the whole project depends.

IPSWICH CORPORATION WATER DEPARTMENT.

The Disposal of the Profits.

The Ipswich Town Council were occupied for a considerable time last Wednesday in discussing the affairs of the Water Department. A report upon their operations during the year ending March 25 last was presented by the Committee. In the first paragraph it was stated that there was no need to act upon the authority given at the last meeting to apply for leave to borrow £5000 further capital, as the Corporation had still unexhausted borrowing powers more than sufficient to enable them to raise the amount. Another clause of the report contained a full account of the works carried out during the year. It appeared that since the undertaking was purchased by the Corporation, over 8 miles of additional or improved mains have been laid in various parts of the borough; and that there are now 383 hydrants available for use for fire and sanitary purposes. Taking the population of the borough at 60,000, an average of 17 gallons of water per head per day was supplied during the year, including domestic and trade purposes. Dealing with financial matters, the Committee said the Council would probably remember that the only sums provided out of the rates for the purchase and carrying on of the water-works were £1200 in 1893, and £1100 in 1894. The Committee recommended that £2300 be now transferred to the Urban Sanitary Authority's general account in repayment of the money so advanced, and that the remaining surplus in hand on the current account of the water undertaking, and all future surplus profits, be applied in reduction of the charges for water throughout the borough. The revenue account showed the total receipts to have been £13,032; and the expenditure £4172—leaving a balance of £8859. The contribution to the sinking fund required £1630; and dividends, £6702. Adding the previous revenue balances (£4934) and the reserve receipt account (£189) to the above-mentioned £8859, made a total of £13,982; and after deducting the sinking fund contribution and dividend, a sum of £5650 remained in hand.

Mr. H. J. W. Jervis (the Chairman of the Committee), in moving the adoption of the report, said he hoped the Committee would never again have to apply to the Council for a rate-in-aid. He dealt at some length with the charges to the consumers, and maintained that the only true use to which the profits of the water-works could be devoted was a judicious reduction of the charges, as opportunity arose. As to the charges for water to the various Corporation Committees, they had during the past three years effected a reduction of some 25 per cent. of what was paid to the old Water Company. He would probably be told that it would make no difference whether they lowered the water charges or whether they reduced the rate; but, as a matter of economical principle, he argued that there was a great deal of difference. If the profits of the department were transferred from time to time to the general fund of the Urban Sanitary Authority, neither the spending Committee nor the general body of ratepayers would have any inducement to regulate their demands upon the fund; and the rate, if temporarily reduced by 2d. or 3d. in the pound, would soon go up to the old figure. The fairer and juster form of relief would be to reduce the charges to consumers, that were levied on an assessment far higher than that of most towns in England, and to act on the co-operative principle, that the profits derived from the sale of water should be returned to the persons from whom they were derived, as occasion might warrant.

Mr. T. R. Elkington seconded the motion.

Mr. F. Bales expressed satisfaction with the financial statement; but he disagreed with the latter part of the report. The town, he held, would not be in the possession of the water-works if it were not for the security offered by the ratepayers; and he contended that every penny of profit should be applied in alleviation of the rates. He proposed an amendment to the effect that the latter part of the clause should be left out, so as to leave the disposition of any future surplus open to further consideration.

Mr. Cattermole seconded the amendment.

The Mayor (Mr. G. F. Josselyn) spoke in favour of the amendment, which, at his suggestion, was formally worded, after the deletion of the Committee's proposal, "And that the remaining surplus in hand on the current account of the water undertaking be carried forward."

The amendment was carried by 14 votes to 5.

Mr. Jervis thereupon said that he considered this a very important question, which deserved more consideration than it had received. As at present advised, he felt that he must resign his seat on the Water Committee.

Alderman Cowell pointed out that the vote simply meant that the question should not be decided now. He thought the course Mr. Jervis had recommended was the one that would ultimately be adopted. The vote had not been hostile to Mr. Jervis.

Mr. Jervis said he did not treat it as a personal question; but he was looking at it in the interests of the inhabitants of the borough.

The subject then dropped.

ANTWERP WATER-WORKS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Thursday, at the London Offices, No. 96-98, Leadenhall Street, E.C.—Mr. D. Evans in the chair.

The Secretary (Mr. J. M. Hamilton) read the notice convening the meeting; and the report and accounts for 1895 were taken as read. These showed that the income from all sources amounted to £31,799, as compared with £31,478 for 1894; and, after deducting working expenses, the cost of laying on services, and debenture interest, the net revenue was £16,572. Adding to this the balance of £650 brought forward from the last account, made a total credit of £17,222, against which had been charged the contribution to the reserve fund of 5 per cent. on net profits, and the interim dividend of £6000. There was then left for distribution £10,394, out of which the Directors recommended that a balance dividend for the six months to Dec. 31 last be paid at the rate of 4 per cent. per annum, leaving £4394.

The Chairman, in moving the adoption of the report and accounts, said the latter placed the figures so clearly before the shareholders that there was little for him to remark upon. It would be remembered that last year he said that, in consequence of the severe frost and the exhibition, he thought it would be rather difficult in 1895 to keep up to the same amount of profit. They had, however, been fortunate enough to rather exceed it; and the Directors thought this was owing a great deal to the energy of their Manager (Mr. Ad. Kemna), who was extremely persevering and determined to have the rights of the Company attended to as far as possible. At the end of June, £10,000 of debentures would become due. In all probability, the holders would ask the Directors to renew them; but, in the event of any of them not doing so, they would give the shareholders the preference of taking them up. He moved that the report and accounts be adopted, that the dividend recommended be declared, that £3500 be transferred to the sinking fund, that the reserve account be supplemented by £546 (making it £5000), and that the balance of £347 be carried forward.

Mr. W. Blaber seconded the motion.

Information was sought as to various items in the accounts; and general satisfaction was expressed with the position of the undertaking. Among other things, it was stated that the concession ran to 1931, and that the town had the right to take the concern at the end of a term of 30 years, on condition that they paid the Company no less than 20 years' purchase of the amount of money that they were receiving at the time. The Company had now £6945 towards the sinking fund.

The motion was unanimously carried.

The retiring Directors (Messrs. W. Blaber and H. G. H. Norman) and the Auditors were re-elected.

A vote of thanks to the Chairman and Directors and Manager concluded the proceedings.

THE USE OF SEA WATER FOR PUBLIC PURPOSES.

Towards the close of the paper read by Mr. F. W. Grierson at the Society of Arts, on Jan. 22 last, on the subject of the proposed scheme for bringing a supply of sea water to London (see *ante*, p. 175), the author quoted a number of towns where salt water is employed for street-sprinkling and sewer-flushing purposes. As inquiries have been addressed to us from time to time on this matter, it may be useful to place on record the opinions expressed by the officials (Borough Engineer or Surveyor) of the towns selected.

At Barrow-in-Furness, sea water is used for the streets. When this practice was commenced, it was thought that it might have in time a prejudicial effect on the macadam. Two lengths of the same street were therefore selected, and one was watered with sea water and the other with fresh. After an extended trial, it was found that the sea water had no such effect; while for keeping down dust, it was stated to be superior to fresh water. Sea water caked the surface of the road, which remained damp much longer than ordinarily. It was said to bind the top layer of stone, and improve the condition of the road in summer to a marked extent. With regard to quantity, 1000 gallons of salt water are equal in efficiency for street-watering to 2000 to 3000 gallons of fresh.

From Berwick-on-Tweed, the following opinion was received: "Salt water is very effective on roads made or repaired with flint or granite. It has a binding tendency, and causes a skin of adhesive matter to form on the roadway. One-third the quantity of salt water on wood will keep it in a moister state than fresh water will, with no injurious effects. No complaints of salt water affecting the stock of any shopkeepers; and no offensive decay of street refuse caused. All parties having control of street-watering should use salt water where it can be had, from an entirely economical point of view, as well as for the comfort of the inhabitants. One cart of salt water is equal to two carts of fresh water; giving a more lasting and beneficial result. Our macadamized roads that are watered with salt water are a pleasure to drive upon in the summer season in comparison with those watered with fresh water, as we never seem to have a loose stone on them."

At Birkenhead, Blackpool, and Bootle, satisfaction has been expressed at the action of sea water; and at Bournemouth, the following opinion on the matter was given in 1891: "No objections arise to the use of sea water; no nuisance is caused by the admixture of this water with sewage. For flushing sewers, it is quite as good as fresh water, if used in sufficient quantity. It is much more effectual than fresh water for watering roads; one application of salt water being equivalent to three of fresh. The use of sea water on a hard road exposed to the sun or wind causes a sort of glazed condition of the surface. It is in favour with the shopkeepers and public generally; no disagreeable smell is caused, and no complaints are received." In 1895, by the use of sea water, the cost of road-watering was reduced at least 50 per cent. All the streets were watered with salt water; and all the public urinals supplied with it.

At Chatham, sea water has been in use since 1877 for sprinkling

streets, flushing sewers, and supplying urinals. For the first-named purpose, it has been found superior to fresh water; but in the other cases, it is used only on the score of economy.

At Falmouth, pure sea water is pronounced to be preferable to fresh water for street-sprinkling purposes, as, by causing an incrustation of the road surface, it prevents wear and tear, and reduces the quantity of dust. Water-carts are filled from hydrants placed at intervals. At Fleetwood, salt water is found to be much better for street purposes than fresh, for various reasons. At times when dust is most troublesome in the streets (that is, shortly before rain begins to fall), the salt on the surface becomes damp, and so prevents a large quantity of dust being blown into the shops where the doors cannot be closed.

At Gosport and Alverstoke, sea water is used for the streets and for sewer-flushing purposes; and it is stated to give satisfaction to the inhabitants generally. When fresh water was used, the roads required attention twice and sometimes three times a day; but with salt water, once is sufficient. It is not found to tarnish metal goods; and it is preferred for its antiseptic properties. At Grimsby, no deterioration of the roads repaired with granite has been found as the result of the use of salt water; and its use is stated to be more economical than that of fresh water. A supply of salt water has been laid down for sanitary purposes.

At Harwich, sea water has been used for street-sprinkling and sewer-flushing for the past fifteen years; and it is preferred to fresh water for these purposes—especially the former. At Hastings, the use of sea water was reported in 1887 to be very satisfactory as regards economy and efficiency; but subsequently, in 1891, it was objected to both for street-watering and the supply of private houses. The Borough Surveyor expressed the opinion that sea water was quite as efficient as fresh for removing sewage matter; but that the objections to flushing sewers and urinals with it were considerable. He thought the use of salt water for any of the above-named purposes was, from a sanitary point of view, undesirable. He found that 200 gallons of sea water kept down as much dust as it would require 300 gallons of fresh water to lay; but the drawbacks in every other respect were, he said, so great that, if a town had plenty of fresh water, he should say decidedly not use sea water. He was of opinion that there was no saving by, and a very considerable number of objections to it. Last year, he reported as follows: "In practice it has been found that sea water is more efficacious in laying the dust than fresh water, but that the damage done to macadam roads by the salt is very considerable. The general opinion expressed was decidedly adverse to the use of salt water for street-watering. For sewer-flushing, sea water is equally good as, and perhaps, where the gradients are good, better than, fresh water. The Corporation have decided to entirely discontinue the use of sea water, in consequence of having thrown on their hands surface water reservoirs of the capacity of 41 million gallons; and they are now using the water in these for watering and flushing purposes."

At Ilfracombe, the use of sea water was found to assist in keeping the surface of the road free from dust when used for watering. It was especially useful on level roads, or those with slight gradients; but it was liable to make steep gradients slippery when employed on them. It was most efficient for sewer-flushing. The only place where it could be obtained without laying down special plant was at the baths; and the terms and difficulty of being able to get it when required led to its being abandoned.

At Littlehampton, a scheme of sea-water supply was carried out some eight years ago; and it has answered fairly well. One disadvantage was found to attend it. Late in the autumn, when the thoroughfares are generally damp, the saline properties of the water show themselves on the macadamized road surfaces in the form of a slime; but a few good showers of rain remove it. In Londonderry, salt water is found superior to fresh for street-watering, both for effect and as regards economy.

At Plymouth, salt water is used indiscriminately on all macadamized roads; and it is stated that everyone likes it. It is found to be superior to ordinary fresh water from the fact that the roads do not require attending to so frequently as they otherwise would do. At Portsmouth, the Surveyor says: "I am most favourable to the use of sea water for road-watering. It is no doubt more economical than fresh. It is well known that sea water, containing a large amount of salts of a highly deliquescent nature, takes longer to evaporate than fresh water; and the streets will keep moist for a longer period than when watered with an equal quantity of fresh water. It was at first thought by tradespeople that their goods would be injured by the use of salt water; but I have not received a single complaint since the adoption of the scheme. As watering the roads with sea water is so economical, I have strongly recommended my Committee to extend the scheme to the whole of Southsea."

At Redcar, sea water is found to be more effective for laying dust than fresh water, and lasts twice as long. At Ryde, salt water has been employed on the streets for 35 years; and it has been found superior to fresh. But on the steep roads, it is necessary to use fresh water for the second coat, or the surface would become too slippery.

At Shoreham and South Shields, reports favourable to the use of salt water have been made. At Stockton-on-Tees, it is used for watering roads; but as the Corporation command a large interest in the supply of water for domestic purposes, it has not been worth while for them to carry out a scheme of sea-water supply.

At Tynemouth, sea water is employed for sprinkling the streets, flushing the sewers, and supplying the public baths. No objections arise therefrom. The authorities cannot say that sea water is in any way superior to fresh for the flushing of sewers; but for street-watering they consider it is certainly better.

From Yarmouth, the following reports have been received: "For seven years, a flint and gravel road was watered with salt water. The road was about two miles in length, and, when watered with salt water, cost £70 a year less than it did with fresh water; and the road has never been in so good a state of repair. For three years, five miles of gravel and flint road have, as an experiment, been watered with salt water; and the expenses of keeping this class of road are found to be quite 30 per cent. less than with fresh water. Thirty miles of these roads and five miles of granite roads are now watered with salt water. If salt water does a granite road no good, it certainly does it no harm. The sea water appears to gum the dust down on the road; and this must be got off in the early autumn. No bad result has been observed on a wood-paved street. The supposition that delicate articles exposed for sale are injuriously affected is a piece of 'bosh' and a scarecrow. The town is now much more free from dust; and this has pleased the shopkeepers, who, one and all, would vote for salt water in preference to fresh. Street refuse does not become so offensive with sea water as with fresh water. The saving in road material and repairs, and in the cost of water distribution is very great, in consequence of the smaller quantity required; and the roads are much better watered. By flushing, the sewers can be kept quite clean, which is worth the cost of the whole job." This was written in 1887. In 1891, the Surveyor reported: "I know of no objection to the use of sea water for flushing sewers, watering streets, or for the supply of private houses. The admixture of sea water with sewage certainly does not cause any nuisance. The generosity with which the water is used jams more sewer gas out of the sewers, but does not create it. Sea water is quite as efficient as fresh water, and is sanitarily superior. Its chlorine and ozone purify the sewers." Last year he wrote: "On light gravel roads, sea water does good, and saves 25 per cent. in repairs. On granite macadam roads, with heavy traffic, it does no harm. In watering, one load of sea water goes as far as three loads of fresh water."

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Negotiations are proceeding between the Edinburgh Town Council and the Portobello Gas Company, for the acquisition of the Company's undertaking in the event of the City of Edinburgh Extension Bill becoming law. The Bill is at present before a Committee of the House of Commons; but, so far, the gas interest has not been reached. I understand that a provisional agreement has been come to with the Company, under which the Corporation are to take the shares of the Company (which were originally £4) at £6, and are to pay interest at the rate of 6 per cent. upon them for twenty years, at the end of which time the Corporation will complete the taking over of the undertaking by a capital payment on the basis of £6 per share. Of course, the price of gas will be equalized in the two districts—the city and Portobello—as soon as the Act comes into force, if it ever does. This will be a great boon to the inhabitants of Portobello, who at present pay much more for their gas supply than is charged by the Edinburgh and Leith Gas Commissioners.

Coal contracts are engrossing the attention of most owners of gas-works at present. The Gas Committee of the Dundee Town Council have received tenders for their supply for the next financial year, which begins on May 16; and they have remitted them to the Manager, to tabulate and report upon. Over 50,000 tons are required. It is reported that the prices are, all over, about 3d. per ton lower than those now being paid. Upon this announcement, there arises speculation as to how the price of gas will be affected. The price is at present 3s. 4d. per 1000 cubic feet; or, with 5 per cent. discount, it is equal to 3s. 2d. net. There has been an increase of not far short of 20 million cubic feet in the output, which will largely swell the revenue. But, on the other hand, there has been extraordinary expenditure to the amount of about £4000, in addition to which very low prices have been received for sulphate of ammonia. Those who are in a position to know, estimate that at the close of the year, notwithstanding the extraordinary expenditure and the low prices for sulphate, the accounts will balance. This will leave the Council free to deal with next year on its own merits, according to the estimates; and it is expected that, so far as can be seen, there will be a surplus which would enable them to reduce the price of gas by 1d. per 1000 cubic feet. The question which arises is whether the reduction should be made, or whether the anticipated balance should not be utilized for strengthening the sinking fund, which is in rather a weak condition. There is time yet for the consideration of the subject.

Messrs. James Ross and Co., of Falkirk, who hold on lease the chemical works connected with the Dawsholm Gas-Works, lately wrote to the Gas Committee of the Glasgow Corporation stating that the works are now proving too small for the greatly increased quantity of residual products requiring to be manipulated there, and asked that some extension of the works should be undertaken by the Corporation. The matter was remitted to Mr. Convener Mitchell, Bailie Burt, and Councillors Fife and William Stevenson, along with Mr. Foulis, for consideration and report.

The Falkirk Gas Commissioners are inviting tenders for £10,000 of 3 per cent. redeemable Corporation stock. The stock is the balance of £100,000 which they were authorized to raise for the purpose of acquiring the gas undertaking; and it is required primarily to meet the cost of the new rope-guided gasholder which is about to be erected. The security offered is an unlimited guarantee rate over the burgh, the valuation of which, exclusive of railways and canals, is £62,473.

There will be general gratification at the rise in the price of sulphate of ammonia which has been experienced this week; and a hope that the price may continue to advance till it reaches something like the position it held for a while last year. Business has been done for June and July delivery at £8 10s. per ton, which is 17s. 6d. above the lowest price of the present depression.

The annual reports of the Broxburn and Linlithgow Oil Companies have been published this week. Both Companies show improved revenues. In the case of the Broxburn, there has been an increase in the revenue to the amount of £13,000; and the dividend which it is proposed to pay is 7½ per cent., as compared with 5 per cent. a year ago. The Linlithgow Company are able to report a sum of £11,730 at the credit of profit and loss account, out of which they are able to pay a dividend at the rate of 7 per cent. on the preference stock, and otherwise improve the position of the Company. In their case, they report that the demand for lubricating and gas-making oils has been good; and throughout the year there was a gradual advance in prices. Year by year it is more apparent that oil-gas processes are becoming the handmaid to the oil industry.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *May* 2.

Sulphate of Ammonia.—The firmer feeling noticed in the last report has continued throughout the week; and a good business has been done at advanced prices. The bulk of the buying has been for "covering" purposes; but consumers, influenced by low prices and a hardening market, have also been induced to come in to a considerable extent. Prices asked at the close are, however, rather checking further transactions. The Scotch market, which in March experienced the most serious depression, has seen the greatest advance; makers having disposed of the bulk of their ready supplies. The nearest value is £8 2s. 6d. per ton f.o.b. at the usual shipping ports. The demand for home consumption is falling off somewhat as the end of the spring manure season approaches. In the forward position, there has not been the same improvement as for prompt and early delivery. There would no doubt be buyers at prices recently accepted; but at the 2s. 6d. to 5s. per ton advance asked, there does not seem to be much disposition to operate.

Nitrate of Soda.—The demand is easing off; but, so far, prices are fairly well maintained. On spot, the quotation for ordinary quality is 7s. 10½d. per cwt., and for refined 8s. Cargoes, ordinary quality, are worth 7s. 10½d. per cwt.

LONDON, *May* 2.

Tar Products.—Benzols are still very flat, and prices low. But there are more inquiries; and buyers seem very anxious to cover the requirements which they have deferred booking as long as they possibly can. There is not much life in pitch, although considerable business has been done during the past week, at prices ranging from 30s. to 33s., according to port and quality. Creosote and oils remain at the low level they have now reached; but, with the decreasing production, some improvement may arise. For July-December, higher prices are being asked than for prompt. In the matter of anthracene, it is reported that alizarine is being offered at lower prices. How far this may affect anthracene prices, it is difficult to say; but, with the reduced production at this season of the year, accentuated by the large quantity of coal being displaced by solar oil for gas-making purposes, the reduced quantity of anthracene available should strengthen the position of anthracene itself. Carbolic acid is quoted at about last week's prices.

Prices may be taken as follows: Tar, 19s. to 23s. 9d. Pitch, 30s. to 33s. Benzols, 90's, nominal, 1s. 10d. to 2s.; 50's, 1s. 7½d. Toluol, 1s. 5d. Solvent naphtha, 1s. 3d. Crude, 30 per cent., naphtha, 9d. Creosote, 1d. Creosote salts, pressed, 52s. 6d.; drained, 30s. Cresylic acid, 1s. Carbolic acid, 60's, 2s.; 75's, 2s. 4d. Anthracene, "A," 10½d.; "B," 8d. to 9d.

Sulphate of Ammonia is very considerably improved; and business has been done at £8 5s., with a tendency to still higher prices. To-day's price ranges from £8 2s. 6d. to £8 5s., less 3½ per cent., while gas liquor is offered at 5s. 6d. to 7s. per ton.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The failure of the informal conference of the Coal Trade Conciliation Board on Thursday to come to an agreement upon the proposals set forward, on the one hand by the federated miners, and on the other by the federated coalowners, as a basis for the continuance of the Board, was not by any means unexpected, at any rate in this district. Mr. Alfred Hewlett, of the Wigan Coal and Iron Company, who was in the chair, takes a very strong attitude upon the question; and certainly will be no party to binding the coalowners down to the minimum wage proposed by the Miners' Federation. On the other hand, the miners seem equally determined to fight on the question of a minimum wage. Neither side, however, is in a strong position to enter upon another conflict. The coalowners would be quite unable to get together anything like such a combination as that which brought about the last struggle; and the Miners' Federation is not only weak financially, but has suffered considerable loss of membership during the recent very depressed period of trade. It is therefore more than probable that some means of compromise will be arrived at; and that this is the general expectation is evidenced by the absence of any pressure on the part of buyers to place out orders for extra quantities, or even to enter into forward contracts in anticipation of another protracted coal strike. The position generally remains without material change; and except as regards engine classes of fuel, the demand for all descriptions continues very limited in weight. Pits, as a rule, are not being kept going more than four days per week; and supplies are plentiful. In the better qualities of round coal, suitable for house-fire requirements, the business doing shows a continued steady falling off, with the approach of summer; and although there is no quoted change in list rates, a weakening tendency is noticeable, buyers of anything like quantities being able to obtain a concession upon current rates. At the pit mouth, 10s. per ton is the average figure for best Wigan Arley; 8s. to 8s. 6d., for seconds Arley and Pemberton four-feet; and 6s. 6d. to 7s., for common house coal. The lower descriptions of round coal meet with a very slow sale; and collieries in many cases are either restricting their output as much as possible, by putting their common mines on short time, or else closing them altogether for the present, owing to the extreme depression in this branch of trade, and the excessively low prices which have to be accepted to secure orders. The unsatisfactory outlook as regards business in these qualities of fuel is well illustrated by the low rates at which the important railway contracts for forge coals are being renewed; and this may possibly afford some indication as to gas coal prices. Last season, 6s. 3d. per ton, which was considered a low figure, was the average price at which these contracts were taken; but this year 5s. 9d. is being accepted, one colliery having placed about 50,000 tons on this basis. The ordinary pit-mouth prices for inland sales of steam and forge coals are without quotable change; 6s. per ton being still about the average figure. With regard to engine classes of fuel, the demand continues active; and the present output, which is not over plentiful, moves off readily. Prices show an upward tendency, and advances of about 3d. per ton are obtainable in some instances; but generally quoted rates, though very firm, are without alteration. The better qualities range from 4s. 6d. to 5s. per ton at the pit, with common slack averaging 3s. 6d. to 3s. 9d. In the shipping trade, the weight of business doing shows no increase, and prices are as low as ever; common steam coal being still readily obtainable at 6s. 9d. to 7s. per ton, delivered at the ports on the Mersey, or Partington tips of the Manchester Ship Canal.

Northern Coal Trade.—The coal trade in the north has received the stimulus which usually follows on the opening of the Baltic ports; and most of the steam coal collieries in Northumberland have now full work. For best Northumbrian steam coals, the quotation is generally 8s. 3d. per ton f.o.b.; while steam smalls are steady at about 3s. 6d. to 4s. per ton. There has been rather a better demand for coal for manufacturing purposes; but the price is unchanged. Household coals are depressed; and the price is about 10s. per ton f.o.b. for fair qualities. Coking coal is steady, and is in very good demand at the present time. The position of the gas coal trade is rather unequal—some of the collieries which export a considerable extent being very fairly busy, while others which depend on the home trade are very poorly occupied. One or two local contracts are in course of negotiation; and it is anticipated that the prices will average about equal to 6s. 3d. to 6s. 4½d. per ton f.o.b. The quotation for occasional cargoes is, however, generally higher than that. Rather more smithy coal is being sent out just now; one or two of the Tyne collieries supplying such fuel largely abroad. In coke, the home demand is large, and is well maintained; and from 13s. 9d. to 14s. per ton f.o.b. is about the general price for best Durham coke at the Teeside blast-furnaces. The export from the Tyne is still rather low; but the quotation is 14s. 9d. to 15s. per ton f.o.b. Gas coke is in moderate demand just now; and in some cases prices seem a little easier, though the production is not large. There are rumours that one of the most important groups of collieries in the gas-coal district of North Durham is likely to change hands; but there is, up to the time of writing, no official confirmation of these statements, though they are believed by some coal viewers.

Scotch Coal Trade.—The coal trade in Scotland maintains the same character—an increased output, but no advance in prices as yet. Judging by the rates which are being obtained in gas coal contracts, the tendency seems rather to be downward. There is every prospect of the demand continuing; but there is no appearance of any upward change in the market. Supplies of all sorts are plentiful. The prices quoted are: Main, 5s. 9d. per ton f.o.b. Glasgow; ell, 6s. 3d. to 6s. 9d.; splint, 6s. 3d. to 6s. 6d.; and steam, 7s. 6d. The shipments for the week amounted to 152,063 tons—an increase of 9718 tons on the preceding week, and of 1059 tons as compared with the corresponding period of last year. For the year to date, the total shipments have amounted to 2,041,993 tons—an increase of 137,255 tons upon the quantity in the same period of last year.

Georgetown (British Guiana) Gas Company, Limited.—The Directors of this Company report that the profit for the half year ending Dec. 31 last amounts to £315; and after adding the balance from the previous six months, and deducting the interest on bonds, &c., the balance available is £216, out of which the payment of a dividend is recommended on the preference share capital at the rate of 8 per cent. per annum. The Directors regret that the balance is not sufficient for the declaration of a dividend on the ordinary share capital; and it is therefore proposed to carry forward the remaining £134.

Bombay Gas Company, Limited.—The Directors of this Company open their report for the year ending Dec. 31 last with the interesting intelligence that the negotiations with the Municipality, referred to in the previous report, have resulted in the Company securing a contract for the public lighting of Bombay on the Welsbach incandescent system for a period of ten years from July 1 last; and the lamps are in process of conversion. The gas and meter rental amounted to £56,561; showing a reduction on the previous year of £843, due to the conversion of a considerable number of the public lamps to the incandescent system during the last three months of the year. The number of private consumers continues to steadily increase. The expenditure for coal carbonized was less by £1385—the result of a smaller consumption of coal and lower rates of freight. The loss by exchange was £24,221, the whole of which has been written off profit and loss account. With the balance brought forward from the previous year (£743), the available profit is £16,384, and after deducting the interim dividend paid in December last (£7200), the sum of £9184 remains to be dealt with. The Directors recommend a dividend of 3½ per cent.; making 6½ per cent. for the year, and leaving a balance of £784 to be carried forward.

The Local Government Board and the Basingstoke Water Supply.—The Basingstoke Town Council have applied to the Local Government Board for sanction to borrow £16,000 for water-supply works. An inquiry has been held; but the Board are not altogether satisfied. In a communication to the Council, they say they understand that the total quantity of water which will eventually be required for the purposes of the borough is estimated at 750,000 gallons per day; but the quantity at present obtained from the new well which has been sunk, and from which it is now proposed to supply the borough, does not exceed 400,000 gallons. They, therefore, wish, before further considering the application, to be convinced that the yield from the new well and adits will be sufficient for the estimated requirements of the borough. For this purpose they suggest that the Town Council should arrange for pumping from the proposed source day and night, without intermission, for a period of at least fourteen days; and that a record be made of the quantity of water pumped, and the height before the pumping begins and immediately after its cessation. Replying to an inquiry by the Town Clerk, the Local Government Board have again written to say that they will not be prepared to include in any loan for a general scheme the expenses of a boring for water from which the town derives no permanent benefit. The correspondence has been sent to the Consulting Engineer (Mr. H. Rofe), with a request that he will report on the subject.

Tarapaca Water-Works.—The report of the Directors of this Company to Dec. 31, 1895, states that the net profit for the year amounts to £52,020 which, added to the balance brought forward—viz., £6994—makes a total to the credit of profit and loss account of £59,015. Of this an interim dividend was paid Sept. 30 last at the rate of 3½ per cent.; and the Directors now propose to pay a final dividend of 4 per cent, making 7½ per cent. for the year, to place £10,000 to the reserve fund for redemption of debentures, and to carry forward the balance of £19,015.

A Dispute at the West Bromwich Gas-Works.—A dispute has arisen at the West Bromwich Corporation Gas-Works between the Committee and a number of employees. It appears that it originated in connection with the recent introduction of some labour-saving apparatus. The operatives decline to submit to certain conditions which the Committee wish to impose with regard to the "stint" they shall be required to perform each day. The Trade Union with which the men are associated has taken up the matter; and one of the chief officials has sought an interview with the Committee on the subject. On the other hand, the Committee decline to allow interference from outsiders, asserting that they prefer to deal directly with their employees. A special meeting of the Committee will be held in the course of a few days, to consider the points in dispute. It is said this will probably result in an amicable settlement being arrived at.

English Incandescent Gas-Share Company, Limited.—An extraordinary general meeting of this Company was held last Thursday at the Cannon Street Hotel, Major-General de la Poer Beresford presiding, for the purpose of confirming, as a special resolution, the resolution passed on the 9th ult. making certain alterations in the Articles of Association as required by the Stock Exchange Committee before granting an official quotation of the Company's shares. The Chairman formally moved the confirmation of the resolution. Mr. Hill seconded the motion; and it was agreed to. In the course of the proceedings, it was stated by the Chairman that the Company had given notice of appeal against the decision of Mr. Justice Wills in respect of their action against the Sunlight Incandescent Company. He congratulated them upon the successful result of their action against the De Mare Company, by which the validity of their own patents must now be established beyond contest.

The Water Supply of Plymstock.—For some months past, the question of the water supply of Plymstock has been under the consideration of the Parish and District Councils; and, at the request of these bodies, Mr. H. Francis has considered schemes for providing an adequate supply. His report was laid before a meeting of the ratepayers on the 23rd ult. One of the proposals was to obtain water from the Plympton District Council. Mr. Francis estimated the expenditure on works at £5477, and the annual charge for a supply of 20,000 gallons per day at £410, equal to 13·5d. per 1000 gallons; for 30,000 gallons per day, £441, equal to 9·67d. per 1000 gallons; and for 40,000 gallons per day, £471, equal to 7·75d. per 1000 gallons. The alternative scheme was to obtain a supply from the Plymouth Corporation. In this case, the works were estimated to cost £5727; and the annual charge would be as follows: For 20,000 gallons per day, £431, equal to 14·2d. per 1000 gallons; for 30,000 gallons per day, £492, equal to 10·85d. per 1000 gallons; and for 40,000 gallons per day, £553, equal to 9·09d. per 1000 gallons. In the course of the discussion, it appeared that many of the ratepayers were impressed with the idea that water was to be obtained in the parish. Mr. Francis said that if they had water in Plymstock they should certainly use it; but he had not been able to find it. He recommended the Plympton scheme as the cheaper. A majority of those present decided, however, that steps should be taken to provide a supply from local sources.

The Proposed Metropolitan Water Board.—A meeting of representatives from the various county councils and county boroughs whose districts are included within the area of the proposed Metropolitan Water Board was held at the Westminster Palace Hotel yesterday week. The Chairman of the Surrey County Council, upon whose invitation the meeting had been convened, presided. Lord Onslow and Mr. Beachcroft were present from the London County Council; and Surrey, Middlesex, Kent, Hertfordshire, Essex, and Croydon were also represented. The Chairman, having explained the present position of affairs in relation to the Bill, put the following resolution before the meeting: "That it be respectfully intimated to Her Majesty's Government that, in the opinion of this conference, the interests of the County of London, and of each and all of the surrounding county authorities within what is called in the Bill the Metropolitan Water Area, are so diverse as to make the constitution of a Water Board as proposed impracticable without injustice to the several areas contained therein." The resolution was seconded by Mr. Bigwood, M.P.; and, after considerable discussion, it was unanimously adopted. The Chairman then submitted a resolution which, as slightly amended at the instance of Mr. Charles Burt (Surrey), was as follows: "If any Board be formed, each of the outside counties should, in the event of such Board seeking powers to obtain a fresh supply of water in the County of London, or for acquiring any of the existing Water Companies, have a statutory right to withdraw its district from the Metropolitan Water Area, and to acquire, or control, the local sources and means of supply, upon equitable terms." To this the representatives of Middlesex—Mr. Bigwood and Sir Richard Nicholson—strongly objected, on the ground that they were positively opposed to being included in the Board at all. The Chairman said it was impossible to meet the Government Bill simply with a *non possumus*. No formal vote was taken on this resolution; but as the result of the Chairman's detailed questions, it appeared that Surrey and Essex were favourable, and Kent substantially so; while Middlesex opposed it, and London, Hertfordshire, and Croydon declined to express any opinion.

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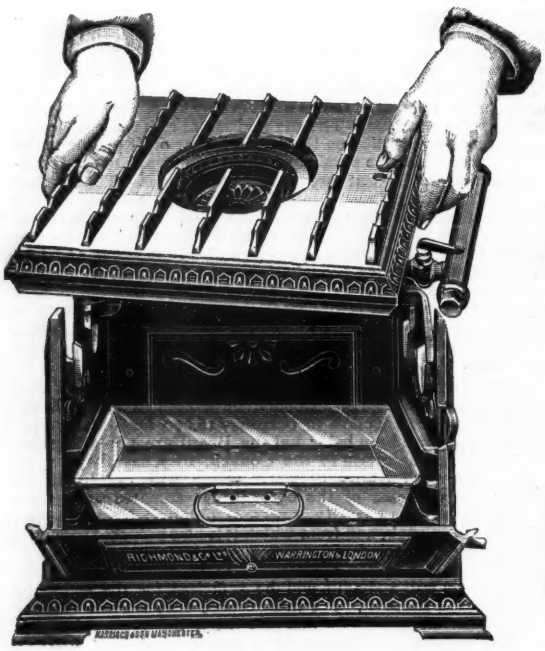

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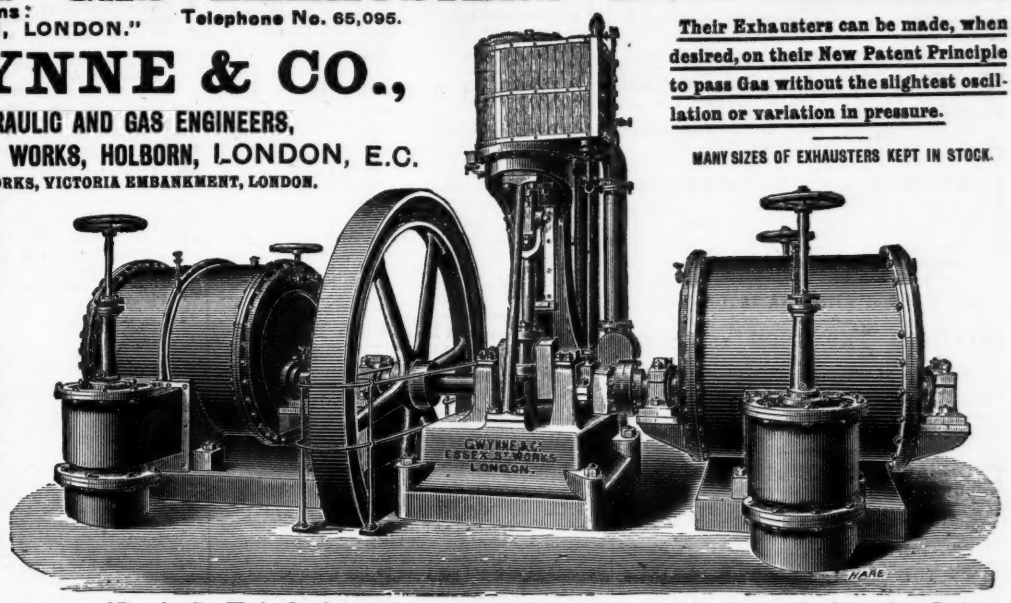

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R. ANDREWS, Practical Retort-Setter, has NOT RETIRED from Business, as reported. RETORT SETTING in all its Principles and Branches. Established 1864.
Address 67, Sugden Road, Lavender Hill, LONDON, S.W.

GOLD MEDAL, 1892.

TUBES and Fittings for Gas, Steam, and Water, in stock to 8 inches diameter; Iron and Steel Ascension-Pipes.
JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

HUTCHINSON BROTHERS, Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. 898, last week's issue.)
Telegrams: "HUTCHINSON BROS., BARNSLEY."

SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

ECONOMY IN PURIFICATION.

INCREASE the Efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP.
And J. EVERY & SON, Phœnix Iron-Works, LEWES.

TO GAS COMPANIES MAKING SULPHATE OF AMMONIA.

THE Use and Value of Sulphate of Am- monia as Manure—A Leaflet, suitable for Distribution among the Farmers of their respective Districts, by WILLIAM ARNOLD, F.S.I., Land Agent, Rating Surveyor, and Valuer (late Chairman of the Tamworth Gaslight and Coke Company); together with valuable Formulæ, Rotation of Crops and Manures for the same, intended for the use of Tenant Farmers and others interested in Land, and to promote the sale of Sulphate of Ammonia for the production of Corn and other Crops by English Gas Companies.
Prices: 100 Copies, 10s.; 250 Copies, £1 2s. 6d.; 500 Copies, £2; 1000 Copies, £3 15s.
LONDON: WALTER KING, 11, Bolt Court, FLEET STREET.

SITUATION wanted as Manager in Country Gas-Works. Main and Service Laying and Gas Stove and Meter Fixing undertaken. Many Years' Experience. Excellent Testimonials; 8½ years at last Works.
Address F. SIMMONDS, 3, Station Road, NEW ROMNEY.

WANTED, a Situation as Rental Clerk, and COLLECTOR, in a Water or Gas Works, or both. At Home or Abroad. In present situation over Five Years.
Address H. RUSSELL, Wrist Wood Cottage, Water-Works, BEXHILL-ON-SEA.

WORKING Manager wants a Situation in a small Gas-Works, 15 years' Experience in the Manufacture and Distribution of Gas in all its Branches. Age 31.
Apply to No. 2660, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS Stoker wanted, Day and Night Shifts. House, Coal, and Gas free.
Apply, stating Particulars and Wages required, to the SECRETARY, Gaslight Company, FELIXSTOWE.

WORKS Chemist Wanted. Well up in Gas Making, Tar Distilling, Anthracene, Carbolic, and Benzol Manufacture. State Age, Salary, Experience, and enclose *copies* of Testimonials.
Address No. 2657, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Bexhill Water and Gas Company, a steady Young Man as CLERK and COLLECTOR. Applicants must have held similar position, be good Accountants, and thoroughly well acquainted with Gas Company's Books.
Application, together with References as to character and ability, to be made to the Manager, Mr. F. RUSSELL, Gas-Works, BEXHILL.

CITY OF LEEDS.
(GAS DEPARTMENT.)

THE Gas Committee of the Leeds City Council are prepared to receive APPLICATIONS for the position of MANAGER of the New Wortley Gas-Works.
Salary, £300 per annum, with House, Coal, and Gas.
Preference will be given to one having experience of Stoking Machinery.
Applications, stating Age and accompanied by not more than three Testimonials of recent date, addressed to the Chairman of the Gas Committee, Municipal Buildings, Leeds, will be received not later than Wednesday, the 20th of May, endorsed "Gas Manager."
R. H. TOWNSLEY,
General Superintendent.
April 25, 1896.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E. and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

It is Worth Your While to Buy DIRECT.
THE RELIANCE LUBRICATING OIL COMPANY SUPPLY on APPROVAL "RELIANCE" NON-CORROSIVE LUBRICANTS (which, through their superiority, have the largest sale in the world)—viz., Engine, Cylinder, and Machinery Oils, 11½d.; Spindle Oil, 8½d.; Gas-Engine and Dynamo Oils, 1s. 6d. per gallon; Barrels Free and Carriage Paid. Also Liquids for Gas Making, Enriching, &c.
RELIANCE LUBRICATING OIL COMPANY, WATER LANE, GREAT TOWER, LONDON, E.C.
Depôts at Liverpool, Bristol, Hull, Glasgow, and Newcastle-on-Tyne. Telegrams: "Subastral, London."

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

BOROUGH OF CHORLEY.

APPOINTMENT OF GAS MANAGER.

THE Corporation of Chorley are pre- pared to receive APPLICATIONS for the appointment of ENGINEER and MANAGER of their Gas-Works. The Gentleman appointed will be required to devote the whole of his time to the discharge of the Duties of his Office, and to enter into a bond in the Sum of £200 for the due performance of such duties. The duties do not include the collection of Gas-Rents, &c.
The Salary will be £200 per annum, clear of all Expenses.
Canvassing Members of the Council, either directly or indirectly, is strictly prohibited.
Applications, stating Age, and previous Employment, accompanied by not more than three recent Testimonials, to be sent to me on or before Tuesday, the 12th of May, 1896.
By order,
JNO. MILLS,
Town Clerk.
Town Hall, Chorley,
April 25, 1896.

CONDENSER.

WANTED, a second-hand Cast-Iron CONDENSER, of about 18 Pipes, 6 inches or 7 inches diameter, with Bends on top, and Box at bottom.
Apply, by letter, to No. 2659, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—One 600-light Station Meter (round), by Parkinson, 6-inch Inlet and Outlet in good condition.
Apply to the LOWESTOFT WATER AND GAS COMPANY, London Road, LOWESTOFT.

FOR SALE—Two small Gas Exhausters (one with Engine combined). Both perfectly new. Also one second-hand PURIFIER, 9 ft. by 7 ft.
SELLERS PICKERING AND CO., Gas Engineers, Ravensthorpe, YORKS.

FOR SALE—24 five-inch H and Dip PIPES. Also a 5000 cubic feet per hour STATION METER, with 6-inch Connections.
For Particulars, apply to J. C. BENNETT, Gas-Works, BRIDGNORTH.

FOR SALE, very Cheap—One 6-inch Dry- Faced CENTRE-VALVE for Three PURIFIERS, two on and one off, in perfect order. Replaced by larger.
Apply to T. BURTONSHAW, Manager, Gas-Works, CHIPPING NORTON.

SMETHWICK GAS-WORKS.

OXIDE OF IRON.

THE Gas Committee invite Tenders for the supply of 150 Tons of OXIDE OF IRON, delivered at Soho Station (L. & N. W. Railway), Handsworth Station (G. W. Railway), or at the Gas-Works by Canal Boat.
Sealed tenders, endorsed "Tender for Oxide," addressed to the Chairman of the Gas Committee, to be delivered to the undersigned at the Public Buildings, Smethwick, on or before the 18th inst.
By order,
W. J. STURGES,
Secretary.

TENDERS FOR GAS COAL.

THE Corporation of Droitwich invite TENDERS for the supply of from 1100 to 1300 Tons of best screened GAS COAL, to be delivered free at Droitwich (G.W.) Railway Station, at such times and in such quantities as may be required, prior to the 31st of May, 1897.
Particulars and Form of Tender may be obtained on application to the Manager of the Gas-Works.
Sealed tenders, on the form provided for the purpose (with the Analysis of the Coal to be supplied), endorsed "Tender for Gas Coal," to be sent to the undersigned on or before the 21st of May inst.
The Corporation do not bind themselves to accept the lowest or any tender.
S. JOHN TOMBS,
Town Clerk.
Droitwich, May 1, 1896

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

THE URBAN DISTRICT COUNCIL OF LYMM.

THE above Council invite Tenders for the supply and delivery of 600 yards of 6-inch CAST-IRON MAINS; also sundry SPECIALS.
Sealed tenders, stating price per ton for Pipes and Specials, to be sent to Wm. Mullard, Esq., Clerk to the Council, on or before the 20th of May, 1896, endorsed "Pipes."
The Council do not bind themselves to accept the lowest or any tender.
Further Particulars may be had on application to
WILLIAM SEVERS,
Gas Manager.
Lymm, Cheshire,
May 2, 1896.

THE URBAN DISTRICT COUNCIL OF LYMM.

THE above Council are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Gas-Works, for a term of One Year from the 1st day of July, 1896.
The Tar and Liquor will be delivered free into Contractor's Boat on the Bridgewater Canal.
The Purchaser will have to enter into an Agreement with the Council for the due performance of his Contract.
Sealed tenders, stating price per ton for Tar and price per ton for Liquor (5° Twaddel), to be sent to Wm. Mullard, Esq., Clerk to the Council, on or before the 20th day of May, 1896, endorsed "Tar."
The Council do not bind themselves to accept the highest or any tender.
Further Particulars may be had on application to
WILLIAM SEVERS,
Gas Manager.
Lymm, Cheshire,
May 2, 1896.

THE URBAN DISTRICT COUNCIL OF LYMM.

THE above Council are prepared to receive TENDERS for the supply of GAS COAL and CANNEL, to be delivered at their Gas-Works in Lymm, for a term of One Year from the 1st day of July, 1896.
The probable quantities required are about 1200 Tons of Gas Coal, and 250 Tons of Cannel, which must be freshly wrought, and well screened, and free from Sulphurous Pyrites or other objectionable matter; but the Council reserve the right of increasing or decreasing the quantities named.
The person whose tender is accepted will be required to enter into an Agreement with the Council for the due performance of his Contract.
Sealed tenders, stating price per ton delivered alongside the Works, to be sent to Wm. Mullard, Esq., Clerk to the Council, on or before the 20th day of May 1896, endorsed "Coal and Cannel."
The Council have no special Form of Tender, and do not bind themselves to accept the lowest or any tender.
Further Particulars may be had on application to
WILLIAM SEVERS,
Gas Manager.
Lymm, Cheshire,
May 2, 1896.

BOROUGH OF BRIGHOUSE.

TENDERS FOR GAS COAL, CANNEL, AND LIME.

THE Gas Committee are prepared to receive TENDERS for the supply and delivery of GAS COAL and CANNEL and BUXTON LIME required at the Mill Lane and Birds Royd Gas-Works during the Year ending the 30th of June, 1897.
Specification and Form of Tender can be obtained on application at the Gas Engineer's Office, Public Offices, Brighouse.
Sealed tenders, stating price per ton delivered at the Gas-Works, or alongside the Gas-Works, by the Calder and Hebble Canal, or at Brighouse Railway Station, must be sent in on or before Monday, the 18th day of May, 1896, addressed to the Town Clerk, Public Offices, Brighouse, endorsed on the outside "Tender for Coal," or "Lime," as the case may be.
The lowest or any tender not necessarily accepted.
By order,
JAMES PARKINSON,
Town Clerk.
Town Clerk's Office, Brighouse,
April 28, 1896.

BRIGHOUSE CORPORATION.

TO MANUFACTURING CHEMISTS AND OTHERS.

THE Gas Committee of the Brighouse Corporation are prepared to receive TENDERS for the purchase of the surplus TAR and the LIQUOR produced at their Gas-Works for a term of One, Two, or Three Years from the 25th of March.
The Tar and Liquor can be loaded into Contractors' Carts on the Works, or into Barges on the Calder and Hebble Canal (which runs alongside) by Pipe direct from the Works.
Any further Particulars can be obtained on application to the Gas Engineer.
Sealed tenders, endorsed on the outside "Tender for Tar," or "Liquor," as the case may be, stating price per ton at the Gas-Works, must be sent on or before Monday, the 18th day of May, 1896, addressed to the Town Clerk, Public Offices, Brighouse.
The Committee do not bind themselves to accept the highest or any tender.
By order,
JAMES PARKINSON,
Town Clerk.
Town Clerk's Office, Brighouse
April 28, 1896.

CITY OF LEEDS.
(GAS DEPARTMENT.)

TENDERS required as below—
For CRAVEN or DERBYSHIRE LIME.
For WROUGHT-IRON TUBES.
For Pressed and Common Red BRICKS.
Forms of Tender may be obtained on application to the undersigned.
Endorsed tenders, addressed to the Chairman of the Gas Committee, Municipal Buildings, Leeds, will be received not later than Wednesday, the 20th inst.
The Committee do not bind themselves to accept the lowest or any tender.

R. H. TOWNSLEY,
General Superintendent.

Municipal Buildings, Leeds,
May 2, 1896.

CITY OF LEEDS.
(GAS DEPARTMENT.)

THE Gas Committee of the Leeds City Council are prepared to receive TENDERS for the purchase of a number of Old WET and DRY GAS-METERS and a quantity of Old BRASS, now lying at the Stores Department, 21, Dewsbury Road, Leeds, where the same can be inspected.
Forms of Tender for the old Meters may be obtained on application to the undersigned.
Endorsed tenders, addressed to the Chairman of the Gas Committee, Municipal Buildings, Leeds, will be received not later than Wednesday, the 20th inst.

R. H. TOWNSLEY,
General Superintendent.

Municipal Offices, Leeds,
May 2, 1896.

CITY OF LEEDS.
(GAS DEPARTMENT.)

TENDERS FOR GASHOLDER PAINT.

THE Gas Committee of the Leeds City Council are prepared to receive TENDERS for the supply of good OXIDE PAINT, suitable for Painting Gasholders.
Sample tins, containing not more than 5 lbs., mixed ready for use (Colours, drab and dark red), to be sent to the undersigned not later than Saturday, the 16th inst., and price per hundredweight to be quoted delivered at the Stores, 21, Dewsbury Road, Leeds.
Tenders, addressed to the Chairman of the Gas Committee, Municipal Offices, Leeds, will be received not later than Wednesday, the 20th inst., and endorsed "Tender for Gasholder Paint."

R. H. TOWNSLEY,
General Superintendent.

Municipal Offices, Leeds,
May 2, 1896.

BRIDGNORTH CORPORATION GAS-WORKS.

SURPLUS TAR.

THE Gas Committee hereby invite TENDERS for their surplus TAR for One, Three, or Five Years from the 1st of June, 1896, delivered in Purchaser's Tanks, at the Bridgnorth Railway Station.
Further Particulars can be obtained from the Manager, Mr. J. C. Bennett, at the Works.
Sealed and marked tenders must be sent to the undersigned not later than Saturday, the 9th inst.
Neither the highest nor any tender will necessarily be accepted.

By order,
J. H. COOKSEY, Town Clerk,
Secretary.

Bridgnorth, May 1, 1896.

BRIDGNORTH CORPORATION GAS-WORKS.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee are prepared to receive sealed TENDERS for the supply of GAS-COAL, including Carriage to the Bridgnorth Railway Station, as follows:—
(1) For One, Two, or Three Years, determinable at the option of the Gas Committee at the end of the first or second Year.
(2) For One Year only.
Evidence as to the quality of Coal must accompany each tender.
Quantity required: About 2000 Tons per annum, in proportionate deliveries as directed—say, 70 per cent. during Winter Months, and 30 per cent. during Summer Months.
The contract to commence at the end of July.
Sealed and marked tenders must be sent to the undersigned not later than Saturday, the 9th inst.
The Committee do not bind themselves to accept the lowest or any tender.

By order,
J. H. COOKSEY, Town Clerk.
Secretary.

Bridgnorth, May 1, 1896.

TIPTON GAS-WORKS.

TAR CONTRACT.

THE Gas Committee of the Tipton Urban District Council invite TENDERS for the purchase of the surplus TAR produced at the above Works, during a period of One, Two, or Three Years, from the 1st of July next.
Particulars may be obtained at the Gas-Works on application to Mr. Vincent Hughes, the Engineer and Manager.
The Tar may be delivered either into Boats or on Rail (L. & N.W. Railway) as may be required.
Sealed and endorsed tenders to be sent to me the undersigned not later than Ten a.m. on Friday, the 15th inst.
The Committee do not bind themselves to accept the highest or any tender.

By order,
GEO. M. WARING,
Clerk to the Council.

Public Offices, Tipton,
May 1, 1896.

LEIGH URBAN DISTRICT COUNCIL.

THE Gas Committee of the Leigh Urban District Council invite TENDERS for about 50 Tons of CAST-IRON MAIN PIPES and IRREGULARS.
Particulars may be obtained on application to the undersigned.
Sealed Tenders, endorsed "Main Pipes," and addressed to the Chairman of the Gas Committee, to be delivered at the Town Hall, Leigh, not later than Monday, the 11th of May next.
The lowest or any tender not necessarily accepted.

ALFRED T. FLETCHER,
Engineer and Manager.

Gas-Works, Leigh, Lancs.,
April 30, 1896.

DENTON URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the GAS COAL required at the Works for a period of One Year from the 30th of June next.
Tenders, addressed to the Chairman, Gas Committee, Gas-Works, Denton, near Manchester, and accompanied with Analysis of Coal, must be sent in on or before the 9th of May next.
Specification and Form of Tender to be obtained from the Manager, Mr. J. Chadwick Smith, Gas-Works, Denton.
The Committee do not bind themselves to accept the lowest or any tender.

By order,
JOHN RICHARDS,
Clerk to the Council.

April 28, 1896.

DENTON URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TAR.

THE Gas Committee invite Tenders for the purchase of TAR produced at their Works. the same to be sent in on or before the 9th of May next.
Particulars to be obtained from the Manager, Mr. J. Chadwick Smith, Gas-Works, Denton, near Manchester.
The Committee do not bind themselves to accept the highest or any tender.

By order,
JOHN RICHARDS,
Clerk to the Council.

April 28, 1896.

GUILDFORD GASLIGHT AND COKE COMPANY.

TO TAR AND LIQUOR DISTILLERS.

THE Directors of the above Company are prepared to receive TENDERS for the surplus TAR and LIQUOR produced by the above Company for the Year ending the 30th of June, 1897. Coal carbonized about 12,000 tons per annum.
All tenders to state the Price per Cask of 40 Gallons and in matter of Liquor to state the Price, per Ounce Strength by the Distillation Test and per Degree Twaddel.
Cartage to and from Railway Station, Guildford, free. All empties to be provided by Contractor.
Tenders, endorsed "Tar" or "Liquor," to be sent to Mark Smallpeice, Esq., Chairman of the Gas Company, Guildford, on or before Monday, the 11th of May, 1896.

By order,
R. T. SIMPSON,
Secretary.

Gas Offices, Guildford,
April 25, 1896.

GUILDFORD GASLIGHT AND COKE COMPANY.

TO COAL MERCHANTS.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 16,000 to 20,000 Tons of DURHAM GAS COAL, to be delivered free at Guildford Station during the period of Two Years from the 1st of July, 1896, to the 30th of June, 1898, in such quantities and at such times as required.
The Directors reserve the right to accept the whole or any portion of the quantity offered, and do not bind themselves to accept the lowest or any tender.
Tenders to be endorsed "Tender for Coal," and to be sent to Mark Smallpeice, Esq., Chairman of the Company, Guildford, on or before Monday, the 11th of May, 1896.

By order,
R. T. SIMPSON,
Secretary.

Gas Offices, Guildford,
April 25, 1896.

STOKE-UPON-TRENT CORPORATION GAS-WORKS.

THE Gas Committee of the Corporation of Stoke-upon-Trent are prepared to receive TENDERS for their further EXTENSIONS at the Gas-Works, Wharf Street, as under, viz.—
Contract No. 2.—For two STEEL LANCASHIRE BOILERS, 18 feet in length by 6 feet diameter, with all necessary Fittings, Brickwork, &c. Contractors to furnish Specification and Tracings with tender.
Contract No. 3.—For the erection of new ENGINE ROOM, GENERAL WORKSHOPS, &c. Plans and Specifications and General Conditions may be seen on application to Mr. Wm. Prince, Engineer and Manager.
Sealed and properly endorsed tenders to be sent in addressed Mr. Councillor Frederick Geen, Chairman, Gas-Works, Stoke-upon-Trent, on or before Twelve o'clock, Thursday, the 14th day of May, 1896.
The lowest or any tender not necessarily accepted.

By order,
J. B. ASHWELL,
Town Clerk.

Stoke-upon-Trent,
May 1, 1896.

NEW MILLS URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL, &c.

THE New Mills Urban District Council invite TENDERS for the supply of best GAS COAL, WASHED NUTS, and CANNEL, for the Year ending the 30th of June, 1897.
Form of Tender and Specification may be had on application to Mr. E. Jones, the Gas Manager.
Tenders are also invited for the purchase of the surplus TAR and LIQUOR for One Year ending the 30th of June, 1897. Coal carbonized, 1900 Tons.
Tenders to be sent in to me the undersigned not later than May 11, 1896.
The Council do not bind themselves to accept any tender.

JOSEPH POLLITT,
Clerk.

Town Hall, New Mills,
April 28, 1896.

BOROUGH OF BARROW-IN-FURNESS.

SUPPLY OF COAL AND CANNEL.

THE Corporation are prepared to receive TENDERS, on Forms to be obtained at the Office of the Gas-Works Manager, for the supply of screened GAS COAL and CANNEL for the Year ending the 30th of June, 1897.
Tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Coal," to be delivered at the Town Clerk's Office, not later than Twelve o'clock Noon, on Wednesday, the 13th day of May, 1896.
The lowest or any tender not necessarily accepted.

By order,
C. F. PRESTON,
Town Clerk.

Town Hall, Barrow-in-Furness,
May 1, 1896.

DEVONPORT GAS AND COKE COMPANY.

TENDERS FOR GAS COALS.

THE Directors of the Devonport Gas and Coke Company invite TENDERS for the supply of 16,000 Tons or 8000 Tons (at their option), of unscreened (through and through) NEWCASTLE OR DURHAM GAS COALS, to be shipped in such quantities and at such times as may be required, between the 1st of August, 1896, and the 31st of July, 1897.
The Cargoes to be discharged at the Tamar Wharf, Devonport.
Tenders may be quoted either c.i.f. or f.o.b. (but c.i.f. preferred), endorsed "Tender for Coals," and addressed to the Chairman, Devonport Gas and Coke Company, Devonport.
Tenders to be sent in on or before Monday, the 18th of May next.
Devonport, May 2, 1896.

COUNTY BOROUGH OF BURNLEY.

TENDERS FOR PURIFIERS.

THE Gas Committee of the Corporation of Burnley are prepared to receive TENDERS for the supply and erection of four PURIFIERS, 30 feet square, with Iron Roof over same.
Drawings may be seen, and Specification with Bill of Quantities and Form of Tender obtained, on application to the undersigned, on payment of 10s. 6d., which will be returned on receipt of *bonâ-fide* tender.
Tenders, under seal, endorsed "Tender for Purifiers," and addressed to the Chairman of the Gas Committee, Town Clerk's Office, Town Hall, Burnley, to be delivered not later than Wednesday, the 20th of May, 1896.

JNO. P. LEATHER,
Gas Engineer.

Gas-Works, Burnley,
May 1, 1896.

CORPORATION OF MANCHESTER.

TENDERS FOR COAL AND CANNEL.

THE Gas Committee are prepared to receive, on or before Wednesday, the 3rd of June next, OFFERS of high-class CANNELS and COALS suitable for Gas Making, for delivery at their Gaythorn, Rochdale Road, and Bradford Road Works, during a period of One, Two, or Three Years, commencing the 1st of July, 1896.
Particulars and printed Forms of Tender may be obtained on application (in writing only) to Mr. Charles Nickson, Superintendent, Gas Department, Town Hall, Manchester.

By order of the Gas Committee,
WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
May 1, 1896.

HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD.

THE Gas Board invite Tenders for the Works required in the Construction and Erection of two 25 ft. by 15 ft. PURIFIERS on Steel Staging; One GASHOLDER, 50 ft. by 12 ft.; CONDENSER, capacity 200,000 cubic feet per diem; and the REMOVAL and RE-FIXING of sundry Apparatus. Pipes, and Connections, &c., at the Gas-Works, Hebden Bridge.
The Specifications and Drawings may be seen on application to Mr. R. West at the Gas-Works, Hebden Bridge, from whom Specifications and Quantities may be had on payment of Half a Guinea, which will be returned on receipt of *bonâ-fide* tenders.
Tenders must be addressed to E. J. Crossley, Esq., Chairman of the Gas Board, at the Office, Crow Nest, Hebden Bridge, and endorsed "No. 2 Contract," and sent in not later than Tuesday, the 19th of May, 1896.
The Board do not bind themselves to accept the lowest or any tender.

RICHARD CRABTREE,
Clerk to the Gas Board.

Crow Nest, Hebden Bridge,
April 30, 1896.

ISSUE OF STOCKS AND SHARES BY AUCTION UNDER PARLIAMENTARY POWERS.

MR. ALFRED RICHARDS undertakes the issuing by Auction of GAS AND WATER SHARES under Parliamentary Powers.

He also holds MONTHLY SALES of GAS AND WATER SHARES at the Auction Mart, Tokenhouse Yard, E.C.

Terms for the issuing of Capital, and also for offering to auction Gas and Water Shares, and all Particulars relating thereto, may be had of Mr. Alfred Richards.

Offices: 18, FINSBURY CIRCUS, E.C.

By Order of the Directors of the Aldershot Gas and Water Company (New Issue of Capital), and by Order of various other Owners.

STOCKS AND SHARES

In the following Gas and Water Undertakings:—

Aldershot Gas and Water Company (New Issue of 135 Six per Cent. Preference Shares).
Brighton and Hove General Gas Company.
Broadstairs Gas Company.
West Ham Gas Company.
Worthing Gas Company.
Bournemouth Gas and Water Company.
Herne Bay Water-Works Company.
Tottenham and Edmonton Gaslight and Coke Company.
Harrow and Stanmore Gas Company.
West Kent Gas Company.
Clevedon Gas Company.
Southend Water Company.

MR. ALFRED RICHARDS will Sell the Above BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Monday, May 11, at Two precisely, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

HORNSEY GAS COMPANY.

NOTICE is Hereby Given, that the Hornsey Gas Company offer FOR SALE BY TENDER £5000 FOUR PER CENT. DEBENTURE STOCK, being the remaining portion of the £30,000 Additional Capital authorized to be raised by Resolution passed at the Extraordinary General Meeting of Proprietors held on the 17th day of February, 1893, in pursuance of the Hornsey Gas Order, 1884, and that they will be prepared to receive sealed Tenders for such Stock not later than Twelve o'clock noon, on Monday, the 1st day of June, 1896.

The amount to be allotted thereon must be paid up in full on or before the 1st day of July, 1896.

The Interest on the Stock will be calculated half yearly up to the 31st of December and the 30th of June in each Year, and be paid by Warrants issued immediately following the Half-Yearly Meetings of the Company, usually in February and August respectively in each Year.

A deposit of £10 per cent. of the nominal amount of the Stock tendered for must accompany each Tender. Any amount not being less than £10 or a multiple thereof may be tendered for; and the Stock will be registered in the Company's Books in the names of the Allottees or their Nominees free of expense.

The Minimum Price, below which no tender will be accepted, has been fixed at One Hundred and Thirty Pounds sterling (£130) for each One Hundred Pounds of Stock.

Particulars and Conditions of Sale, with printed Form thereto (upon which Form only tenders will be received), may be obtained at the Company's Offices, No. 63, Chancery Lane, W.C., between the Hours of Ten o'clock a.m. and Four o'clock p.m.

By order,
(Signed) S. J. WILLIAMS,
Secretary.

Offices: 63, Chancery Lane, W.C.,
April 24, 1896.

STOCKPORT DISTRICT WATER-WORKS COMPANY.

ISSUE OF £5000 NEW ORDINARY STOCK.

BY the Stockport District Water Order, 1890, confirmed by the Water Orders Confirmation (No. 1) Act, 1890, the Stockport District Water-Works Company are authorized to raise, by way of New Capital, any further Sums not exceeding in the whole £32,000, by the issue of New Ordinary Shares or Stock, or New Preference Shares, or Stock, as therein mentioned.

The Company have resolved to create and issue £5000 NEW ORDINARY STOCK.

The said Order provides that the Company shall not in any Year make out of their Profits any larger Dividend on such New Ordinary Stock than £7 in respect of every £100 actually paid up of such Stock.

The Directors of the Company are now prepared to receive TENDERS for the purchase of such £5000 of New Ordinary Stock in lots of £100 each nominal value.

No Tender will be accepted for any Lot at a price less than the reserve, which cannot be less than the nominal value of such lot.

Every tender shall be deemed to be made subject to the conditions herein mentioned, and to the conditions of the said Order.

Tenders must be made on or before Monday, the 25th day of May, 1896.

The Directors do not bind themselves to accept any tender.

Forms of Tender and full Particulars can be obtained at the Company's Office, or at the Offices of Messrs. Earle, Sons, and Co., Solicitors, 54, Brown Street, Manchester.

Tenders must be addressed to the Directors of the Stockport District Water-Works Company, St. Peter's Square, Stockport, and endorsed outside "Tender for Stock."

By order,
ALFRED M. PRICE,
Secretary.

St. Peter's Square, Stockport,
April 23, 1896.

TAMWORTH GASLIGHT AND COKE COMPANY.

THE Directors of the Tamworth Gas- light and Coke Company are prepared to receive TENDERS for the supply of 2600 Tons of best screened GAS COAL, to be delivered at Tamworth Station, Midland or L. & N. W. Railway, from July 1, 1895, to June 30, 1897.

Tenders may also be given for a Two Years' Supply.

Forms of Tender and further Information may be obtained on application to the Manager.

Tenders, endorsed "Tender for Coal," must be sent to the undersigned by May 23, 1896.

The Directors reserve the right to accept tenders for the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any tender.

By order,
W. A. SAPEY,
Manager and Secretary.

Gas-Works, Tamworth,
April 21, 1896.

SCARBOROUGH GAS COMPANY.

SALE BY TENDER OF NEW ORDINARY STOCK.
(IN PURSUANCE OF THE SCARBOROUGH GAS ACT, 1895.)

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER, NEW ORDINARY STOCK of the Company, to the amount of £12,000; such Stock to bear a Maximum Dividend of 5 per cent. per annum, and to be paid up in full on or before the 1st day of July, 1895—being a portion of the Additional Capital authorized to be raised under the powers of the above-named Act, by a Resolution passed at a meeting of the Proprietors of the Company, specially convened for the purpose, and held on the 26th day of June, 1895.

Particulars and Conditions of Tender may be obtained on application at this Office; and sealed tenders must be sent in not later than Twelve o'clock at noon, on the 1st day of June, 1896.

By order,
J. HOLLIDAY,
Secretary.

Scarborough Gas Company's Offices,
32, Westborough, Scarborough,
April 13, 1896.

SCARBOROUGH GAS COMPANY.

SALE BY TENDER OF MORTGAGES FOR THE PURPOSE OF PAYING OFF EXISTING LOANS.
PURSUANT TO SECTION 21 OF THE SCARBOROUGH GAS ACT, 1895.

NOTICE is Hereby Given, that the Directors of the Scarborough Gas Company intend to SELL BY TENDER, MORTGAGES to the amount of £35,750, for the purpose of paying off existing Mortgages granted by the Company under their previous Acts.

The Mortgages will be granted under and by virtue of the Scarborough Gas Act, 1851, the Scarborough Gas Act, 1859, the Scarborough Gas Act, 1867, and the Scarborough Gas Act, 1873, or some or one of them, and subject to the Provisions of the Special Acts of the Company. They will be issued for amounts of £100 each, and will bear interest at the rate of 3½ per cent. per annum, payable half yearly, and the principal moneys secured thereby will be repayable at the end of 20 Years from the 1st of July, 1896.

These Mortgages will rank before the whole of the Company's existing and authorized Share Capital (of which at present £155,994 15s. is issued and fully paid, and a further £12,000 is now about to be issued); and the Interest thereon will have the priority of payment over all Dividends on such Share Capital.

Tenders must be sent in to the Company's Offices, 32, Westborough, Scarborough, not later than Twelve o'clock noon on Monday, the 1st of June, 1896. But no tender will be accepted at a lower price than £100 for each Mortgage; and every Purchaser must pay the whole of his Purchase-Money on or before Wednesday, the 1st of July, 1896.

Copies of the Company's Special Acts may be seen at the Company's Offices, where Particulars and Forms of Tender may be obtained on application.

By order of the Directors,
J. HOLLIDAY,
Secretary.

Scarborough Gas Company's Offices,
32, Westborough, Scarborough,
April 17, 1896.

IMPORTANT SALE OF CHICHESTER GAS COMPANY'S SHARES.

TO BE SOLD, by Auction, by Messrs. WYATT AND SON, on Wednesday, the 20th of May, 1896, at the Dolphin Hotel, Chichester, at Three o'clock precisely, in 50 Lots, by order of the Directors of the City of Chichester Gas Company, FIVE HUNDRED £10 SHARES in the above Company, being the first portion of the Additional Capital authorized to be raised by the Chichester Gas Order, 1881. The Maximum Dividend authorized is 7 per cent.

Printed Particulars, with Conditions of Sale and full Information, may be obtained of Messrs. RAPER, FREELAND, and TYACKE, Solicitors, West Street, CHICHESTER; of ALFRED LASS, Esq., 30, Gracechurch Street, LONDON, E.C.; R. S. CHURCH, Esq., Secretary at the Company's Offices, the Gas-Works, CHICHESTER; and of Messrs. WYATT AND SON, Auctioneers and Valuers, East Street, CHICHESTER, HAVANT, and ARUNDEL.

Price 6s., Cloth Bound,

THE CHEMISTRY OF ILLUMINATING GAS.

By N. H. HUMPHRYS, Assoc. M.Inst.C.E., F.C.S.

This work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas; Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation; Condensation; and Purification.

WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.,
8 Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

ARMSTRONG'S PATENT

CANDLE SAFETY LAMPS.

No. 1. No. 2. No. 3.

43, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation.

Yield of Gas Per Ton . . 11,205 Cubic Feet.
Illuminating Power, 16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality) 13¾ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

PRESENT DAILY PRODUCE AVAILABLE 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton . . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . 13½ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash. . . . . 1·34 Per Cent.
Tar. . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 94½ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COALFIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED.
— *v.* —
"DE MARE" COMPANY,

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED.
— *v.* —
"SUNLIGHT" COMPANY,

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED, HEREBY GIVE NOTICE, as follows:—

VALIDITY. The Company's Patent has been declared Valid on all points after a Fifteen-Day Trial.

NATURE OF INVENTION. The Invention was described by Mr. Justice Wills as a "Pioneer Invention."

SCOPE OF PATENT. The Patent has been given a wide construction; and it was held that the protection given by it was not confined to Mantles manufactured according to the particular prescriptions set out in the Specification.

SHAPE OF MANTLE. The Judge held that a Mantle, even if made in a different form or shape (such as the "De Mare" Fringe or Plume), is still an Infringement of the "Welsbach" Patent.

"DE MARE" JUDGMENT. Judgment for an Injunction, with full Costs, has been given against the "De Mare" Incandescent Gas-Light System.

"SUNLIGHT" JUDGMENT. Judgment was given against the "Sunlight" Incandescent Gas-Lamp Company, Limited, on the question of the Validity of the Plaintiffs' Patent.

"SUNLIGHT" MANTLES. Last about 100 hours.

"WELSBACH" MANTLES. Last about 1000 hours.

"Sunlight" Mantles burn double the gas to produce the same candle power as the Incandescent Gas-Light Company's Mantles.

Users of "Sunlight" Mantles are applying to the Incandescent Gas-Light Company to replace them by their own Mantles.

WARNING. Users of the Incandescent Gas-Light Company's Mantles upon "Sunlight" Burners are Infringers of the Company's Patent, and will be at once proceeded against.

COSTS. Certificates of the Validity of the Company's Patent have been granted both by Mr. Justice Romer and Mr. Justice Wills entitling the Company to Solicitor and Client Costs, which will, in all cases, be rigorously enforced.

INFRINGERS. Actions have been commenced, and are pending against Makers and Sellers of all forms of Incandescent Mantles. The Incandescent Gas-Light Company will take Proceedings against all persons infringing their Patent, whether,

MAKERS,
WHOLESALE DEALERS,
RETAILERS,
or
USERS.

"LIMITED LICENSE." Users of the Company's Mantles upon Burners not sold by the Company are Infringers.

WARNING. Judgments have already been obtained against such users from Mr. Justice Chitty, Mr. Justice Stirling, and Mr. Justice Kekewich.

FAITHFULL & OWEN,
11, Victoria Street,
Westminster.

Solicitors to the Incandescent Gas-Light Company, Limited.

April, 1896.

NOTICE.

The attention of the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, having been again called to the Advertisements inserted in various papers by the Incandescent Gas-Light Company, Limited, of Palmer Street, Westminster, to the effect that the "Meteor" Incandescent Gas-Lights are an Infringement of their Patents, and that they will bring Actions for Infringement against all persons found dealing in any manner with such Lights, the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, HEREBY GIVE NOTICE that they are advised that the "Meteor" Incandescent Lights in no way infringe any of the Patents of the Incandescent Gas-Light Company, Limited, that an action has been commenced to restrain such threats, and that they are PREPARED TO FULLY INDEMNIFY ALL PURCHASERS, DEALERS, AGENTS, and USERS of their Lights against any Legal Proceedings on the part of the Incandescent Gas-Light Company, Limited.

WILSON, BRISTOWS, & CARPMAEL,
1, Copthall Buildings, London, E.C.,
Solicitors to the Meteor Incandescent Lighting Company, Limited, of 35, New Broad Street, London, E.C.

Nov. 30, 1895.

Foap. 4to, Cloth, price 7s. 6d., post free.

Practical Photometry.

By William Joseph Dibdin, F.I.C., F.C.S.

LONDON: Walter King, 11, Bolt Court, Fleet St., E.C

COKE-BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,
165, QUEEN VICTORIA STREET, E.C.
And at STROUD, GLOUCESTERSHIRE.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE
BOGHEAD
CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
12, JOHN STREET, ADELPHI, LONDON, W.C.

NOTE THIS NOTICE PLEASE.

OUR
LONDON OFFICE FOR VISITORS
TO THE METROPOLIS IS STILL
3 & 4, Lime Street Square, E.C.;
BUT
ALL COMMUNICATIONS
MUST NOW BE
ADDRESSED—
LITTLE & GRAHAM, Ld.,
TRANSPORT APPLIANCE WORKS,
SMETHWICK,
BIRMINGHAM.

LOW MOOR BLACK BED

GAS COAL.

YIELD OF GAS PER TON - 10,375 CUBIC FEET.
ILLUMINATING POWER - 17·50 SPERM CANDLES.
COKE - - - - - - - - - 75 PER CENT.

Prices, f.o.r. or f.o.b., on application to

GEORGE & JOHN HAIGH,
RAVENS LODGE AND CONYERS' COLLIERIES,
DEWSBURY.

A TRIAL IS RESPECTFULLY SOLICITED.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

TAR AND LIQUOR PURCHASED.

JOHN CLARKSON MAJOR,
(Established 1851,)
Tar Distiller and Manufacturing Chemist,
WOLVERHAMPTON.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

BOLDON GAS COALS.
Worked by THE HARTON COAL CO., LTD.
Output about 8000 tons per day.

ANALYSIS—

Yield of Gas per ton . .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

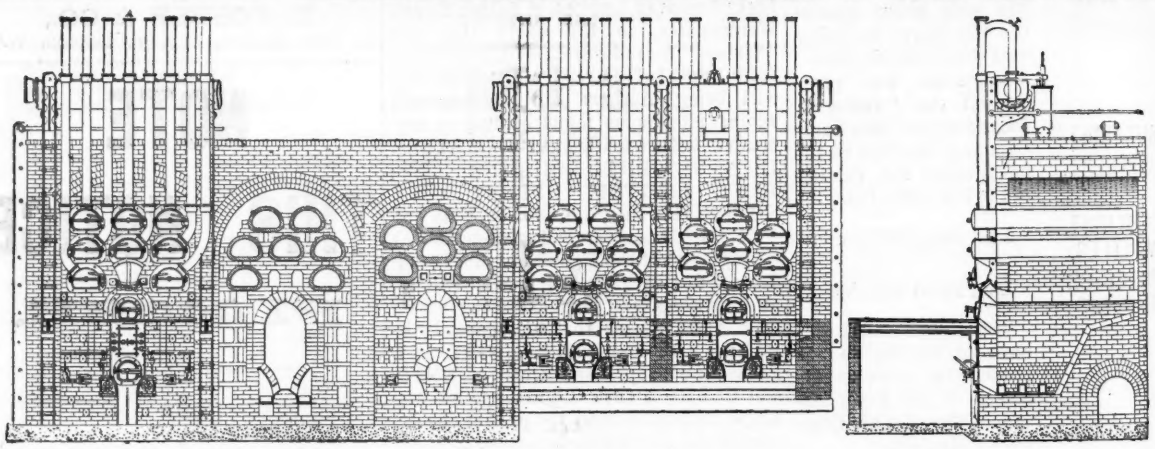
Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Danish Gas Company, Bombay Gas Company, San Paulo Gas Company, Alliance and Dublin Consumers' Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For Prices, &c., apply to the

HARTON COAL COMPANY,
LIMITED,
Newcastle-on-Tyne.
W. H. PARKINSON,
FITTER.

HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE POSITIVELY UNRIVALLED IN PRODUCTIVE CAPACITY, DURABILITY, AND SIMPLICITY OF MANAGEMENT. RETORTS OF ORDINARY DIMENSIONS CARBONIZING FROM 18 TO 24 CWT. OF ENGLISH AND 21 TO 26 CWT. OF SCOTCH COAL PER 24 HOURS, DEPENDING UPON THE NATURE OF THE COAL, AND PRODUCING UP TO FULLY 13,000 CUBIC FEET PER MOUTHPIECE IN THE SAME TIME, AND WITH THE SMALLEST EXPENDITURE OF FUEL ATTAINABLE, AND RETURNING IN PROFIT THE ENTIRE COST OF ERECTION WITHIN TWELVE TO EIGHTEEN MONTHS; AND THUS REDUCING TO INSIGNIFICANCE THE INCREASED COST OF THESE SETTINGS OVER THE COMMON OR GENERATOR FURNACE SYSTEMS.

THESE SETTINGS ARE EXTENSIVELY ADOPTED, AND ARE ERECTED UPON THE SHALLOW AND STAGE FLOOR PLANS. THEY ARE ADAPTED TO ANY EXISTING ARRANGEMENTS, AND PERFECT SATISFACTION GUARANTEED. THE COMPOSITION OF FIRE-RESISTING AND OTHER SPECIAL FIRE-CLAY MATERIALS FURNISHED IS OF THE HIGHEST ORDER; AND THE SYSTEM AS A WHOLE, AS NOW PERFECTED, IS THE RESULT OF LONG EXPERIENCE AND CAREFUL STUDY OF THE PRINCIPLES OF GASEOUS FIRING.

Drawings and Tenders are furnished for the complete erection of Benches, including Retort and Bench Mounting of the most modern and approved description; or existing Ovens fitted up with the Patentee's arrangements.

Full Particulars may be had on application to the Patentee's Agents: **Messrs. JONAS DRAKE AND SON**, Retort Setters and General Carbonizing Engineers, Ovenden, Halifax, Yorkshire, Sole Agents for England, Wales, and Foreign Countries; **C. M. HAMILTON**, Retort Setter and Contractor, 5, Stuart Street, Shawlands, Glasgow, Agent for Scotland and Ireland; and to the Principal Agent, **R. F. HISLOP** (Son of Patentee), General Constructing and Carbonizing Engineer, Gas-Works, Paisley, N.B.

HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE is a *Sine qua non* TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED AND AFFORDING THE HIGHEST SATISFACTION.

The Patentee's SELF-SEALING CAPS FOR THE TOP OF ASCENSION-PIPES, and his "SPECIAL" FLUE PORT BOXES, are most important additions to his Carbonizing Plant.

SPENT LIMES NO LONGER WASTE PRODUCTS.

Under G. R. HISLOP'S Patents, all Spent Limes are effectively recovered at from one-third to one-half the cost of New Lime.
Further Information and Pamphlets from Principal Agent.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
Shipments Promptly and Carefully Executed.

London Office: R. Cull, 84, Old Broad St., E.C.

HUNTER'S
OXIDE OF IRON.
James Hunter, Miner, and Shipper of
NATURAL IRISH BOG ORE.
This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.
Samples and Prices on application.
5, PRINCES STREET, PORT GLASGOW.
Telegrams: "Hunter, Port Glasgow."
Established 1872.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, near DEWSBURY.

R. & A. MAIN,
GAS COOKING AND HEATING STOVES,
92, ALDERSGATE STREET, KINNING PARK,
LONDON, E.C., & GLASGOW.

JOHN BROWN & CO., Ltd., SHEFFIELD.
Proprietors of
ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.
ALDWARKE MAIN GAS COAL
Analysis: 12,600 Feet of 19-Candle Gas per Ton.
Value in Pounds of Sperm, 820·80.
VERY FREE FROM IMPURITIES.
TELEGRAMS: "ATLAS, SHEFFIELD."

THE SILICA FIRE-BRICK COMPANY,
OUGHTYBRIDGE, NEAR SHEFFIELD.
Established 1858. The First Manufactory of Silica and Dinas Fire-Bricks erected in England.
MANUFACTURERS OF
SILICA FIRE-BRICKS
(TRADE MARK "SILICA")
Specially adapted for Siemens-Martin Gas-Furnaces; also for Gas, Copper, Iron, Steel, and other Furnaces where intense heat is required.
BESSEMER GANNISTER, STEEL-FURNACE GANNISTER, COPPER-FURNACE GANNISTER, IRONFOUNDERS' CUPOLA SAND, FINE-SETTING SILICA CEMENT, STEEL MOULDERS' COMPOSITION.
Our Silica Bricks have gained a high reputation for Unsurpassed Quality in most of the leading Firms in England and on the Continent. Export orders delivered Liverpool, Hull, Grimsby, or the Tyne.

MOBBERLEY & PERRY
STOURBRIDGE.
Manufacture & supply best quality of
Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)
Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.
FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c., &c.
EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.
Contractors for the erection of Retort-Benches complete.
London Agents:
BALE & HARDY, Gas Engineers and Contractors,
BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

GASEOUS FIRING A SPECIALTY.

Telegraphic Address: "DRAKESON, HALIFAX."

Telephone No. 43. HALIFAX EXCHANGE.

GAS ENGINEERS. RETORT SETTERS. IRONFOUNDERS.

CONTRACTORS. FURNACE BUILDERS. &c. &c.

SOLE MAKERS OF "MITTON'S" PATENT SELF -SEALING- RETORT-LID.

SOLE MAKERS OF "SETTLE'S" PATENT COMBINED SEAL-REGULATING FLUSH-VALVE.

JONAS DRAKE & SON

-SOLE AGENTS- For "HISLOP'S" PATENT REGENERATIVE FURNACES. FOR ENGLAND, WALES & ABROAD.

OVENDEN, HALIFAX.

LONDON OFFICE; 60. QUEEN VICTORIA ST., E.C.

PHILADELPHIA EXHIBITION, 1876.

ALSO SILVER MEDAL, PARIS.

The Highest Award for Gas-Retorts and other Goods in Fire-Clay has been awarded to KING BROTHERS for their Goods made from their renowned Stourbridge Fire-Clay.

KING BROTHERS,

Proprietors of

STOURBRIDGE CLAYS,

Manufacturers of

Fire-Bricks, Tank Blocks, Glass-House Bricks and Pots, Gas-Retorts, Crucibles in Clay and Plumbago, Gas-Oven Bricks, Bricks for Regenerator Furnaces and Hot-Air Stoves.

STOURBRIDGE, ENGLAND.

CRUCIBLE MANUFACTORY, 46, PENN STREET, CURZON STREET, BIRMINGHAM.

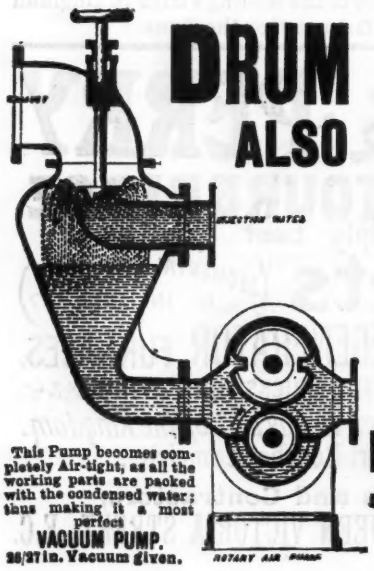
N.B.—Gas, Blast-Furnace, and Glass-House Bricks and Glass-House Pots always in Stock, or made on the Shortest Notice.

"The Force of the Piston Pump with the Capacity of the Centrifugal combined."

JOHNSON'S PATENT

DRUM PUMP AND EXHAUSTER

ALSO VACUUM PUMP AND CONDENSER.



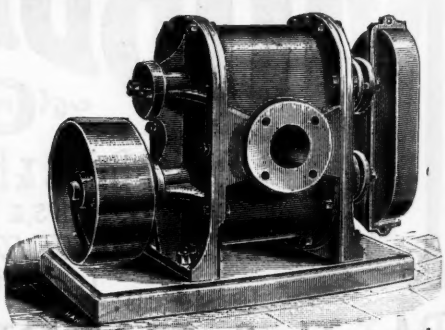
This Pump becomes completely Air-tight, as all the working parts are packed with the condensed water; thus making it a most perfect VACUUM PUMP. 26/27 in. Vacuum given.

No Priming, Valves, or Frictional Working Parts.

The Pump of the future for quickly and economically moving large Bodies of Water, Semi-fluid, &c.

DRUM ENGINEERING Co.

55, ATHOL ROAD, BRADFORD.



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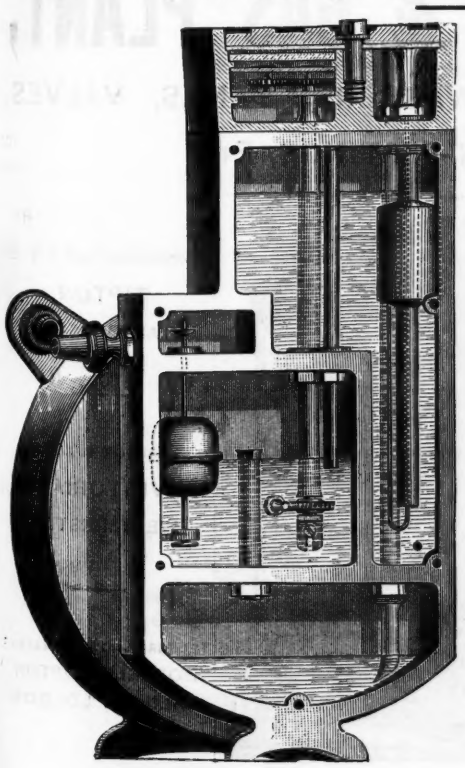

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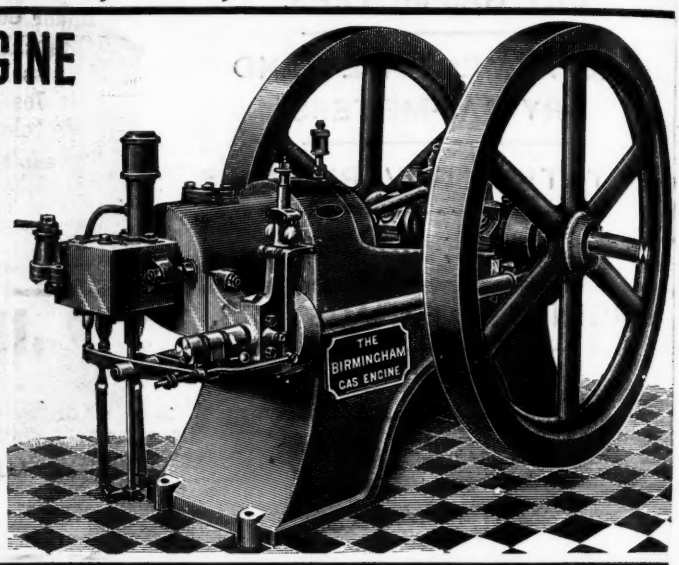

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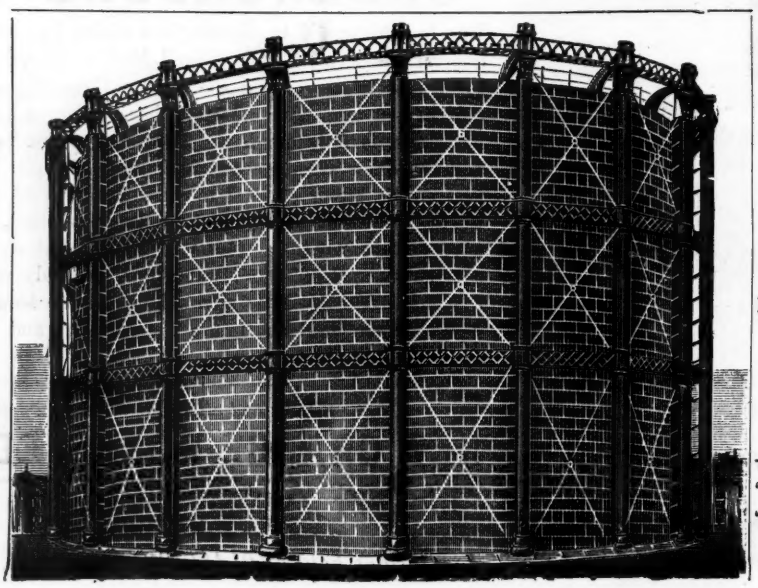

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Belfast (Second Contract)	3,500,000 Cub. Ft.	Manchester	3,000,000 Cub. Ft
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SOCKET-PIPES FOR GAS OR WATER PURPOSES.
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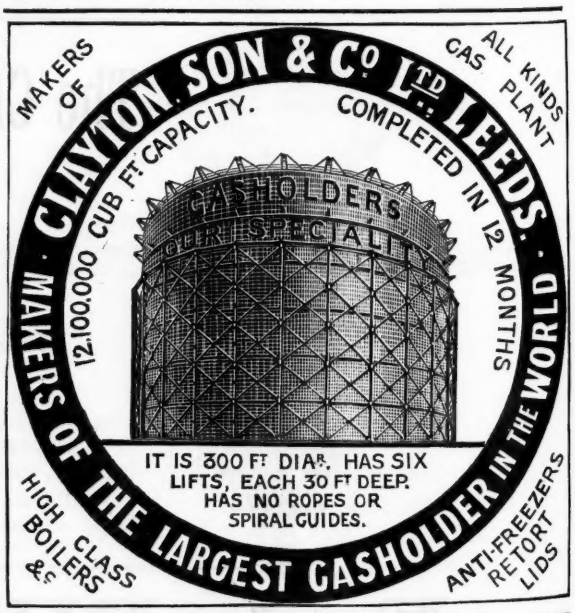
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Over 292,000,000 Cubic Feet of Gas per Day is passing through about 550 of these Machines.

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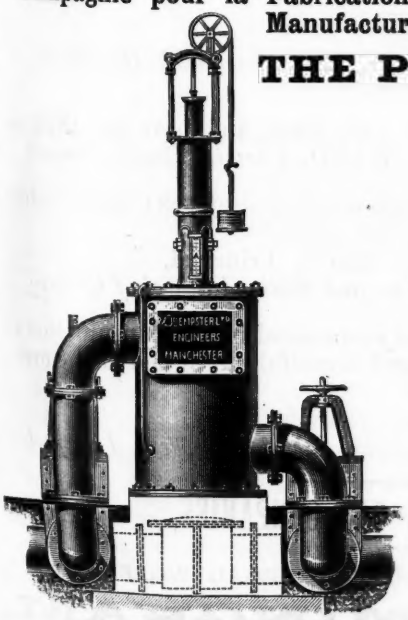

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This Apparatus is in very general use in most of the Gas-Works on the Continent and in America; over **550** being in use in different parts of the World for condensing and arresting all Tar Particles and Vapours from the Gases from Coal, Oil, and Wood.

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So effective is this Apparatus that a piece of white paper placed over a Test-Tap on the Inlet of the Machine is immediately covered with Tar, whilst on the Outlet the white paper remains perfectly clean.

The Machines are made in the following sizes, for Works producing per 24 hours—

	Cubic Feet.		Cubic Feet.
0	35,000	5	500,000
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"They are giving our customers universal satisfaction."

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"During last winter we used them at all the centres where we cooked by gas; and we shall continue to do so until we find they are superseded, which I consider unlikely."

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"It is easy to manage, very good in its results, and most economical in the consumption of gas. Pastry, bread, cakes, and meat are all equally well cooked and beautifully browned in the oven. The grilling, boiling, and simmering arrangements are perfect."

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[See also Advt. p. 864.

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